Croplife®

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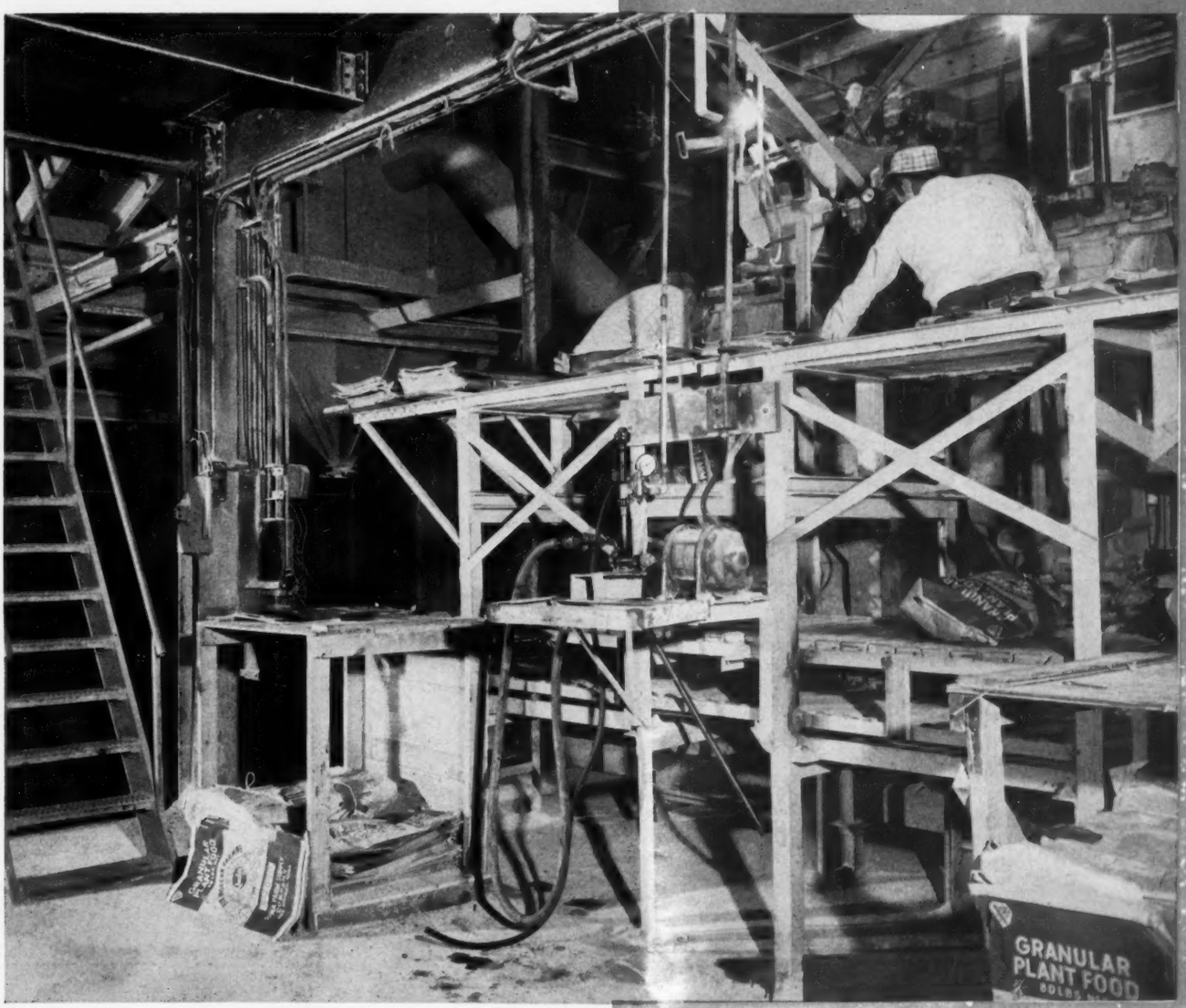
PRODUCTION EDITION

for Manufacturers of Chemicals for Agriculture



BAGGING FACILITIES—Farm Bureau Service Co. of Iowa plant, Des Moines, controls dust problem. See page 4.

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Modern Equipment Spells Success For Mississippi Pesticide Firm

Manufacture of Cotton Pest Control Products Plus High Grade Plant Food Keeps Plant Busy

By Emmett E. Robinson
Croplife Special Writer

SIX MONTHS after completing its facilities for manufacturing insecticides in 1950, the Riverside Chemical Co., Marks, Miss., was unable to get a pound of the necessary ingredients for formulating. A shortage of basic materials existed because of the Korean War.

However, under the guidance of William King Self, the company quickly overcame this handicap and is now doing a thriving business in Mississippi, and parts of Alabama, Tennessee, Arkansas, Louisiana and Missouri. The $300,000 to $400,000 gross the first year has reached somewhere between four and five million dollars the last few years, Mr. Self reports.

The parent organization of the company is Riverside Industries, whose operations back in 1950 included cotton seed and soybean processing, and other activities.

"We saw an opportunity to fill out our line of services," Mr. Self stated. "We felt we could make better use of our manpower and location on a year-round basis and at the same time could provide a service useful to the people with whom we were dealing."

The modern facilities of Riverside include equipment to manufacture mixed fertilizers as well as pesticides. Mr. Self says the company has seen a very gradual increase of interest in high analysis fertilizer. It also operates anhydrous ammonia and liquid nitrogen distribution points.

Production of "Golden River," the company's premium brand of mixed fertilizer, has been under way for a year. Containing a number of trace elements not normally found in usual fertilizers, the product showed a definite potential the first year in profit for the farmers, dealers and the company.

Riverside's "Big 3" insecticides are made with modern equipment, both in dust and liquid forms. Each batch of the blended, stable formulations is tested for uniformity. The company has a private laboratory and a full-time chemist, and its plant capacity is advertised as the largest in the South.

A pre-mixed formula containing methyl parathion, toxaphene, and DDT, "Big 3" is aimed at early, mid- and late-season control of all cotton insects.

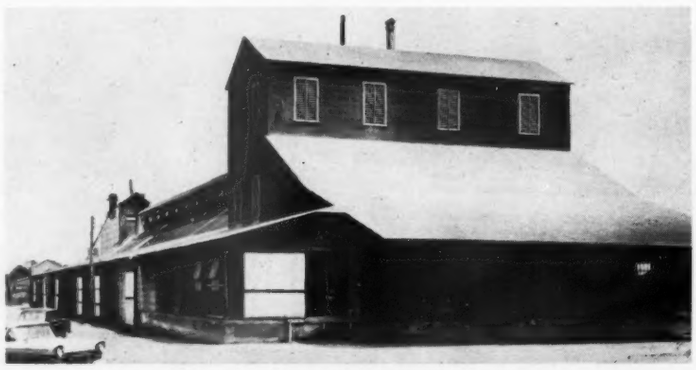
The company operates Pontotoc Chemical and Fertilizer Co. in Pontotoc, Miss., to handle distribution of its products in eastern Mississippi and western Alabama. It also has a warehouse in Blytheville, Ark. Some 200 to 250 persons are employed at the peak of the season, and 300 dealers handle the company's products.

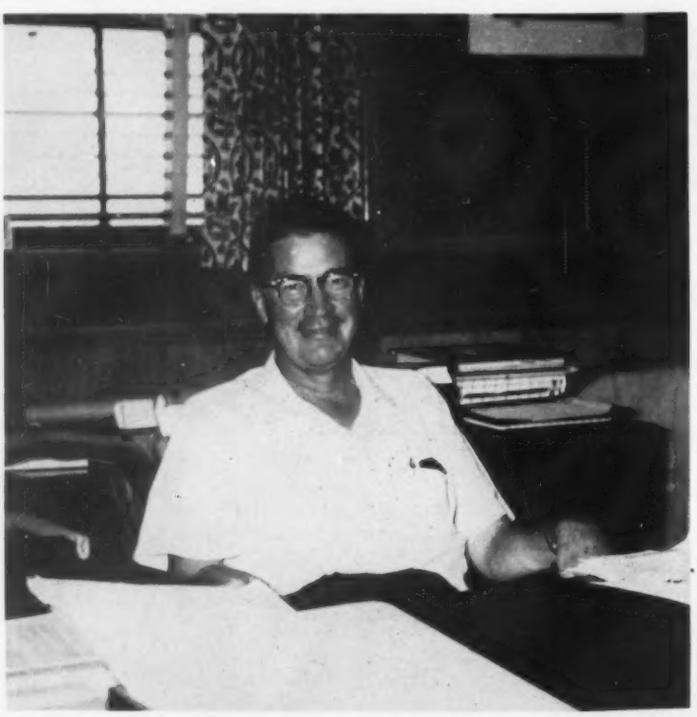
Bill Blalock is in charge of production. In charge of sales in the home territory is I. E. Freeman, and J. E. Young has this responsibility through the Pontotoc operation.

The company tried a unique experiment last year in advertising, Mr. Self explains. A defined area was selected for saturation efforts. With money no object, the company used newspaper, direct mail, and radio advertising to promote its products.

Despite the fact that the Soil Bank clouded the results, Mr. Self feels the experiment was worthwhile and plans to try it again on a limited scale in another area. He believes advertising must "be a little different to be successful."

"When you get right down to it," Mr. Self said in response to a question on the operating principle of the company, "we are a service organization. We feel the greatest thing that we can do for our dealers is to teach them the value of customers who pay their accounts, as opposed to those who don't."





PESTICIDE-FERTILIZER FACILITY—At right, home of Riverside Chemical Co., Marks, Miss. Front of building houses mechanical equipment for mixing and rear contains warehouse space for pesticides and fertilizers in bags. Below, left, William K. Self, proprietor of the plant under whose guidance the firm has built up thriving business in past few years. Below right, is view inside warehouse where bags of the company's "Big 3" insecticides are being stacked for storage.

what's your E.Q.?*

QUESTIONS

	True	False
1. Inorganic salts are frequently added to oil-water systems to break emulsions.	☐	☐
2. It is impossible to prepare practical emulsions in which the aqueous phase contains high concentrations of inorganic salts.	☐	☐
3. Good agricultural emulsifiers may be characterized as individual specific chemical compounds.	☐	☐
4. The anionic components of an agricultural emulsifier impart improved performance in soft water.	☐	☐
5. A good emulsifier can be fully characterized by the ratio of anionic to nonionic components.	☐	☐
6. The active ingredient content of an emulsifier is the chief criterion of its efficiency.	☐	☐
7. Variations in toxicant, solvent and waters require adjustments in emulsifier blend for optimum performance.	☐	☐
8. The ratio of the emulsifiers in a matched pair need not be altered when the concentrate is used at high or low dilution rates.	☐	☐
9. In general, it is safer to formulate slightly higher on the nonionic side than on the anionic side when employing matched pairs.	☐	☐
10. Most formulators use the correct amount of emulsifier in their emulsifiable concentrates.	☐	☐

*Emulsifier Quality

ANSWERS

1. True. Most emulsifiers "salt out" in the presence of inorganic salts which impairs their function and breaks the emulsion.
2. False. Emcols H-A, H-B and H-C are used to emulsify insecticides in concentrated mixed fertilizer solutions in which the salt concentration may approach saturation. These emulsifiers have a unique tolerance to high salt concentrations.
3. False. Most efficient agricultural emulsifiers are blends of several anionic and nonionic surfactants.
4. True, if properly balanced with nonionic components. Conversely, the nonionic components of such an emulsifier impart improved performance in hard water.
5. False. It is not sufficient to balance the anionic-nonionic ratio. Since both anionic and nonionic components have hydrophilic and lipophilic properties, each in turn must be properly balanced to obtain maximum efficiency at the minimum use level. This requires blending several components, in some cases as many as 12 different surfactants.
6. False. The composition of the separate components and their balance is the prime consideration.
7. True. This is achieved most conveniently by the use of matched pairs of emulsifiers.
8. False. The rate of dilution required by the particular field application affects the blend of the matched pair necessary for optimum performance.
9. True. An excess of nonionic may result in excessive creaming which can easily be redispersed, but an excess of anionic may result in a tendency toward oil separation.
10. Only you can answer this. If you are using Emcols, you are saving money because they can be used at low use levels and give outstanding aging stability. Low moisture content, the rigidly controlled components, and Emcol know-how allow you to manufacture superior concentrates at competitive prices.

SCORING: If most of your answers were correct, you definitely have emulsifier "know-how." And most formulators with "know-how" look to Witco's Emulsol Products for leadership in the field of emulsifiers for the pesticide industry. This leadership is based on continued **research** into new problems which arise such as liquid-pesticide, liquid fertilizer formulations...on rigid **control of production** by an outstanding staff of chemists...on **technical service** to help you with your particular problems.

Send for Witco's Manual on "Pesticide Formulation" describing the Emulsol Emulsifiers for the agricultural industry.

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EXTERIOR OF PLANT shows general size of building which houses manufacturing operations of Farm Bureau Service Co. of Iowa in Des Moines. Shrubs in foreground, though bare during winter months, add beauty to the landscape in the summer.

Good Housekeeping Policies Improve Employee Morale at

Midwest Granular

ONE OF THE most dust-control-conscious fertilizer plants in a wide area is that of the Farm Bureau Service Co. of Iowa, at Des Moines. Along with this good housekeeping policy go many other innovations involving employee morale, efficiency of production, and community relations.

The plant, erected in 1949, was hailed at the time as being one of the most modern in the entire country, and it has continued to live up to its reputation. Not only in its technical phases (it operates a TVA continuous ammoniator) but also in its other programs, including an active safety organization, the company has moved steadily forward.

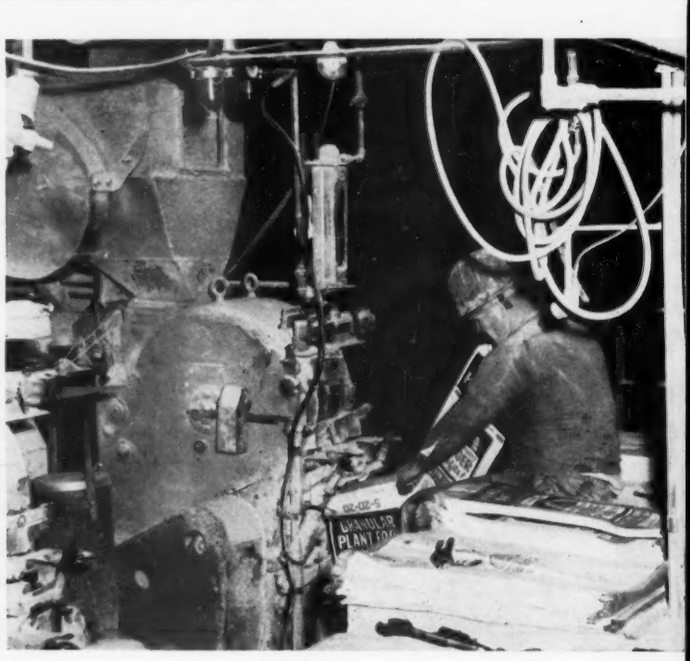
Take employee morale as an example. R. Sid Bondurant, manager of the manufacturing division of the company, says that if morale is good, it means that other things about the plant and the company are likewise satisfactory.

The dust collection system is an example, he says. Once a considerable problem, dust is now among the least of the company's worries. Three bag dust collectors operating from the end of the dryer reclaim practically all the stray dust and fumes so there is no complaint from neighbors. The Iowa firm was among the very first fertilizer companies to make use of this type of dust collectors.

Probably the most outstanding feature is the granulation process. For nine years, the plant has been a sort of pioneer in granulation, with a considerable amount of research being done there over the years. It was one of the first complete granular plants, but later the pug mill was replaced by the TVA device.

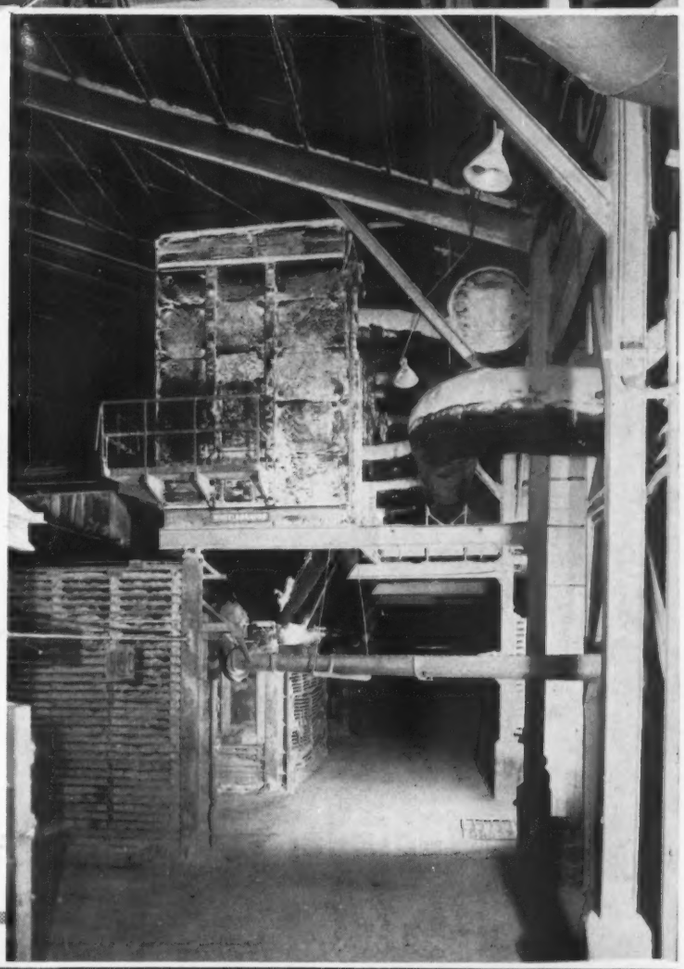
The plant operators have added to the drying capacity, perfected its sizing of granules and reduced the volume of fines and oversize particles to a minimum. Production runs from 30-35 tons an hour, depending upon the grade being made. Six grades are considered as most popular. They are

PLANT OPERATORS—At left are persons responsible for efficient operation of Farm Bureau Service Co. of Iowa plant in Des Moines. Above is Sidney Bondurant, plant manager, at his desk. Lower left, is Mr. Bondurant with Russell Overton, plant superintendent, standing in front of Wheelabrator dust collector used to ventilate bag shipping operations. Below: bag-filling area with workman working with 50 lb. bags of 5-20-20.



EFFLUENT GASES from rotary drier at left rear are carried through insulated duct across top of picture, to collector. Control of gases and dust is one of the features of Farm Bureau Supply Co. of Iowa plant at Des Moines.

Fertilizer Plant



10-20-0; 15-15-0; 8-32-0; 5-20-20; 5-20-10, and 12-12-12. A new specialty product, a corn starter fertilizer has proved a good seller, too.

Because of the good drying facilities, the plant can store much of its finished goods through the winter months without loss of condition. It has storage space for 15,000 tons of finished product and for 4,000 tons of raw materials.

Most of the finished goods are packaged in 50 lb. valve-type bags. No 80 nor 100 lb. bags are used. About 80% of the products are shipped by truck and the remainder by rail. The plant is situated on the Rock Island Railroad.

Russell Overton, plant superintendent, Mr. Bondurant, Don Stuart, production foreman, and John Porter, director of the plant food and seed division, all work together in achieving the gains seen in the plant's operation during the past several years.

The company maintains a chemical control laboratory under the direction of Rexford Walker, chemist, who checks production analyses. The laboratory is a modern one for analysis of both fertilizers and feeds manufactured by the company.

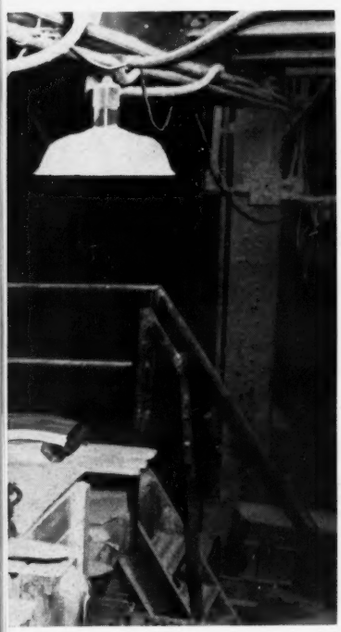
Analyses are made of materials produced by the night shift, too, with samples taken the first hour of work, the second hour, and at the end of the shift, to maintain quality control at all times.

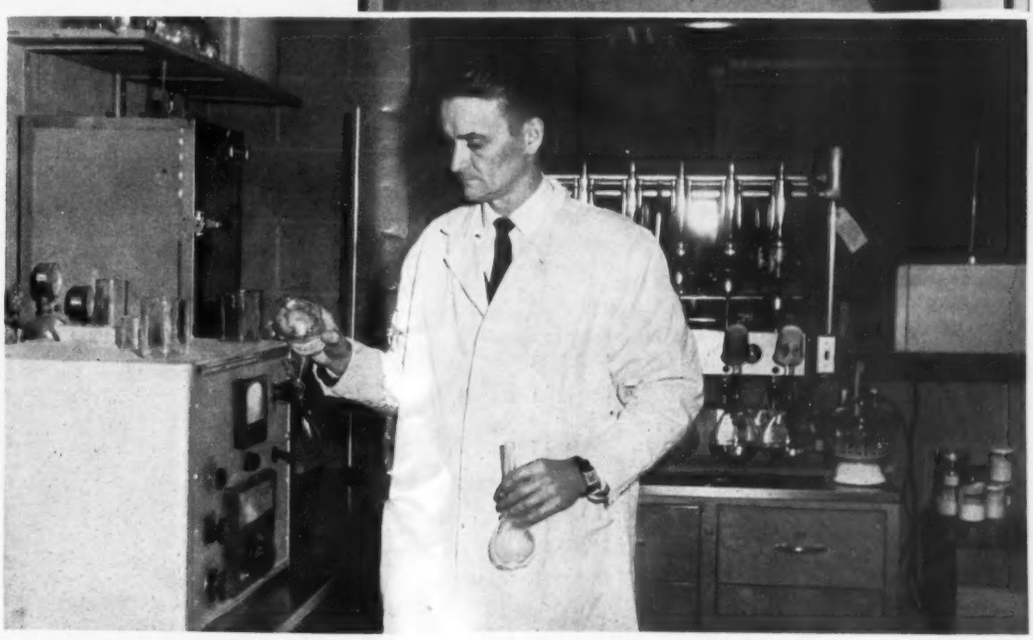
The chemical lab plays an important part in the plant's operation, and is typical of the general characteristics of the company. Its presence is in line with other innovations, like modern material handling devices, up-to-date bagging equipment and efficient dust control methods.

"Before we took the dust out of the plant, morale was a problem," Mr. Bondurant recalls. "When we overcame this dust problem, many of the other difficulties cleared up. The change has been gradual, but the improvement is about 100% now. We

Turn to **FACILITY** page 32

INSIDE IOWA PLANT—At right is insulated duct work leading to completely insulated Wheelabrator five-compartment continuous automatic dust collector. This equipment vents rotary drier. Screw conveyor is seen at bottom of the five hoppers which discharge material onto conveyor to be carried back to ammoniator. Below, right, is view in company's analytical laboratory where Rexford Walker, chemist, is at work.





Maintaining Fire Hoses, Equipment

By C. G. Hisle
Spencer Chemical Co.
Vicksburg, Miss.

FIRE FIGHTING EQUIPMENT as well as any other type of safety equipment should be inspected periodically in order to insure the equipment being in proper working condition. We have a program specifically designed to handle our particular needs. Periodic inspections are conducted by members of the Plant Protection Section.

The following is a partial list of the types of extinguishers:

Carbon Dioxide Extinguishers

These extinguishers should be inspected annually. They should be weighed to detect any loss. If the loss is 10% or more, the extinguishers should be recharged.

Dry Chemical Extinguishers

The CO_2 cartridges should be weighed annually to detect any loss in weight. If a loss in weight is shown the cartridge should be replaced. Use only dry chemicals recommended by the manufacturer. It is also advisable to up-end and jar these extinguishers once or twice each month to keep powder from caking. The dry powder extinguishers used in the automobile require little or no maintenance.

Soda Acid Extinguishers

These should be recharged annually or immediately after use. Since the sodium bicarbonate and sulfuric will deteriorate with age; the extinguisher will lose its effectiveness if neglected. Where the extinguisher is apt to freeze in cold weather, a heated cabinet should be provided. Since the chemical action is affected by cold weather, anti-freeze agents should not be substituted for the heated cabinet. Anti-freeze agents also may cause corrosion, reducing the extinguisher action or impeding the chemical reaction.

It goes without saying that any type of first aid fire fighting equipment should be re-serviced immediately after use and returned to its original position.

The following type of maintenance is recommended for cotton rubber-lined hose: It should be stored on hose racks and should be removed frequently and replaced to change the location of the folds. If folded in the same position for a long period of time, the hose may be damaged by resulting sinks. The hose is frequently damaged by dragging over rough surfaces or by exposure to acid, gasolines, oil, heat and mildew.

After use the hose should be brushed free of all dirt. If brushing does not remove the dirt, the hose should be washed and scrubbed with plain water. Oil may be removed with soap or a mild alkali followed by a thorough rinsing. The hose then should be hung on racks to dry before being stored away.

It is recommended that annual tests be made on rubber lined hose. In general, they should be subjected to approximately 50 lb. pressure in excess of the normal water pressure. Normal testing pressure is usually about 150 lb. per square inch.

Also the stand pipe and hose nozzle should be checked periodically to be sure they are working properly.

These are a few of the items to be taken into consideration in properly "Maintaining Fire Fighting Equipment."

California Firm Buys English Stock

WOODLAND, CAL.—Agriform of Northern California, Inc., has purchased a portion of the stock of Liquid Fertilizers, Ltd., of Yorkshire, England.

The latter firm has never done any manufacturing, but has been distributor of a weak ammonia solution. The company is now being prepared for manufacturing the same liquid compounds now processed by Agriform in its own plant in Woodland, 22 miles north of Sacramento.

D. W. Galbraith, president of Agriform, has recently returned from Great Britain where he visited with Brigadier Kenneth Hargreaves, president of Liquid Fertilizers, to set up the joint company. Mr. Galbraith becomes a director of the British firm.

At the present time Hollis Barron, agronomist for Agriform, is in Yorkshire working with the company on the "agronomics" or economics of agriculture, and during the spring Mr. Galbraith will return to England together with his plant manager, Herbert Taylor, to supervise the building of the new processing plant.

Agriform of Northern California, no longer related to other Agriform companies in the west, operates one other factory in addition to its main one at Woodland. This is located in Fallon, Nevada. Ten branches in California distribute the fertilizers, and three more in Nevada. The company also distributes insecticides manufactured by another firm under contract, but branded with the Agriform label.

Calspray Names Head of Canadian Subsidiary Firm

RICHMOND, CAL.—Leroy C. Kennedy has been named vice president and director of Ortho Agricultural Chemicals, Ltd. by California Spray-Chemical Corp., of which the former is the Canadian subsidiary.

Mr. Kennedy has been with Calspray for the past 22 years and was formerly manager of the credit division and more recently of Calspray's foreign department. According to Arthur W. Mohr, president, Mr. Kennedy will have responsibility for the production and distribution of the firm's "Ortho" line of agricultural insecticides, fungicides, fertilizers, seed protectants and weed killers in the Dominion of Canada. He will also retain his position of manager of the foreign department.

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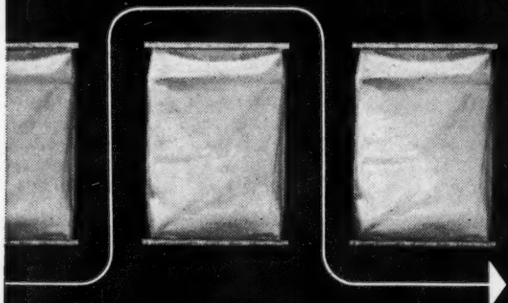

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Grace Announces Expansion Plan for Memphis Facility

NEW YORK, N.Y. — William J. Haude, president of Grace Chemical Division of W. R. Grace & Co. has announced a major expansion of Grace's nitrogen plant at Woodstock, Tenn., near Memphis. Present capacity of the plant is 100,000 tons/year. Adding the new capacity to the plant will bring the yearly ammonia tonnage total to more than 160,000 tons.

This second expansion follows in the wake of an expansion of the urea section which doubled urea production during the fall of 1959. Originally, the capacity of the urea plant was 50,000 tons/year and the added facilities bring the total to 100,000 tons/year. The added urea tonnage makes the plant the third largest in the United States and the fifth largest in the world. Mr. Haude said ammonia construction will get underway soon and he expects completion of the enlarged section by 1961.

The need for additional ammonia production was based on several considerations, the company explained. When Grace doubled its urea facilities it was necessary to draw more heavily on the existing ammonia plant in order to supply raw materials needed to make urea. Present ammonia facilities were taxed to capacity necessitating the purchase of ammonia from outside sources in order to keep the supply-demand picture in balance. Additionally, increasing consumption of ammonia for both industrial and fertilizer uses prompts this expansion of Grace's ammonia production capacity.

"While contracts for this plant have not been let, an announcement will be made shortly concerning the engineering and construction firms that will build the new plant," a company spokesman said. He added that the expanded facilities are expected to parallel the present 300 tons a day ammonia train and economies will be realized from operating integration although the new ammonia train will be capable of independent production of ammonia.

The process selected for the new plant consists of five major process steps as follows:

1. Primary and secondary high pressure (130 lb. per sq. inch) steam methane reforming.

2. Two steps of carbon monoxide shift conversion, each followed by a stage of carbon dioxide removal by monoethanolamine.

3. Methanation of residual carbon monoxide.

4. Synthesis gas compression.

5. 9,000 lb. per sq. inch Casale ammonia synthesis.

Grace plans to locate the new plant directly east of its present ammonia facilities to allow integration of operation with the present ammonia plant. It will not interfere with its operation during construction.

Cyanamid's Urea Plant on Stream In Ontario, Canada

HAMILTON, ONT.—A multi-million dollar urea plant, obtaining its raw materials from a neighboring steel mill and built on reclaimed land, has been put on stream by Cyanamid of Canada Ltd., a subsidiary of American Cyanamid Co.

According to Dr. L. P. Moore, president of Cyanamid of Canada Ltd., the new plant is Canada's first facility for the production of urea.

The new plant is able to extract all of its raw materials—hydrogen, nitrogen and carbon dioxide—from gases piped from the adjacent Dominion Foundries and Steel Co. mill.

The process not only supplies the basic ingredients for urea production, but leaves the gases, which are shipped back to the steel mill, more efficient for use as a heating fuel. An elaborate system of piping connects the two facilities.

The plant will have a rated production capacity of 66,000 tons urea annually. Anhydrous ammonia will be produced at the rate of 52,500 tons annually, with most of it being utilized in the production of urea and approximately 12,000 tons available for other purposes.

Located on the shores of Hamilton Bay, a St. Lawrence Seaway port, the plant occupies about 20 acres of land reclaimed by filling a section adjacent to the steel mill, bringing the urea unit as close as possible to its source of raw materials.

The urea is produced in some 240 miles of enclosed pipes and vessels, with every process automatically recorded and controlled.

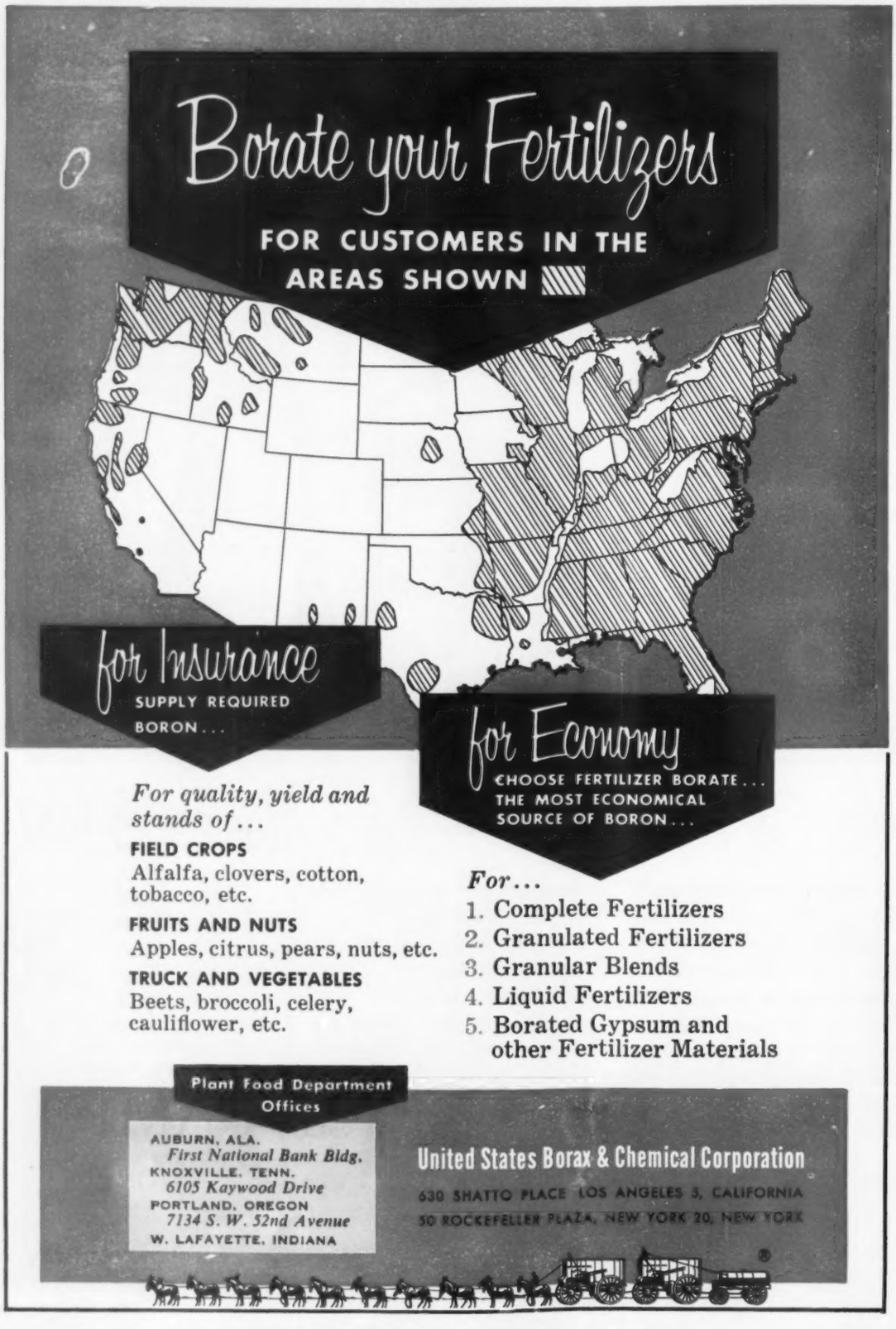
A key step takes place in two autoclaves, 54 inches in diameter and 44 feet long. Within these, ammonia and carbon dioxide are combined under heat and pressure, creating highly corrosive conditions.

To protect the interiors of the autoclaves, $45,000 worth of silver was used as coating, said to be the world's largest silver-plating application.

According to Dr. Moore, the new plant will serve a growing market for urea in both Canada and the United States.

Construction of the plant was started in 1957 and was carried out by Chemical Construction Co., New York. A maximum of 720 men were employed on the project during the peak construction period. Over-all employment under production conditions will be approximately 100.

The bulk of the urea produced is expected to go into agricultural use as a fertilizer component and as an animal feed supplement.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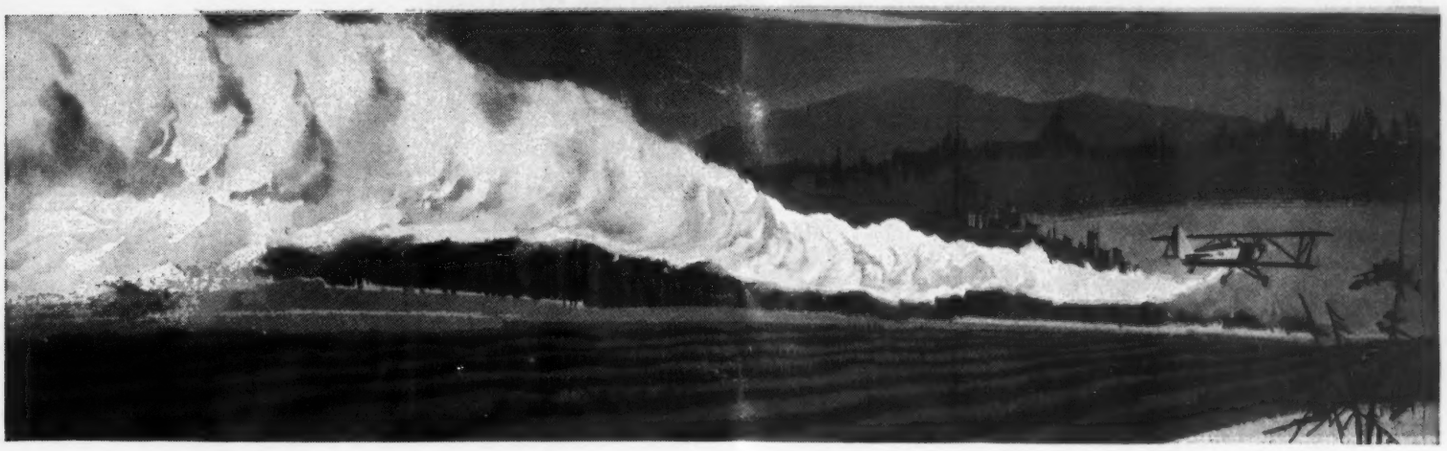

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MEETING HIGHLIGHTS . . .

Round Table Speakers Of Conventional Plant

WHAT ARE some of the factors governing rapid and satisfactory curing of non-granular fertilizer products, and also those having to do with satisfactory physical condition in the package?

Dr. J. O. Hardesty, U.S. Department of Agriculture, Beltsville, Md., outlined these factors at the recent fertilizer industry Round Table in Washington, D.C. Here are the factors he outlined:

Rapid and Satisfactory Curing depends on:

I. A relatively high moisture content, which promotes
- (a) rapid rate of chemical reaction with a corresponding rapid increase to the maximum temperature of the pile,
- (b) increase in plasticity of the mixture to insure tighter packing,
- (c) a high amount of soluble salts in solution to give a high degree of crystal knitting and primary set when the pile temperature drops

II. Finely-divided ingredients, which promote
- (a) thorough mixing, and
- (b) close packing in the pile to give
  - (1) uniform chemical reaction, and
  - (2) firm primary set

III. High mechanical pressure (large pile) promotes
- (a) close packing to give
  - (1) uniform chemical reaction, and
  - (2) firm primary set

Satisfactory Physical Condition in the Package, depends on:

I. A relatively low moisture content, accompanied by
- (a) little or no chemical reaction,
- (b) no moisture absorption during, or subsequent to the bagging operation
- (c) a low amount of soluble material in solution, and therefore
  - (1) less soluble material thrown out of solution by any given range of temperature drop, which produces
  - (2) less chance of crystal knitting

II. Large particle size, or aggregates, of ingredients which provides
- (a) a minimum number of points of contact between particles, and therefore,
  - (1) less packing, and
  - (2) less crystal knitting
- (b) minimum surface area, to give
  - (1) efficient coverage with a finely divided conditioner, and
  - (2) less moisture absorption

III. Low mechanical pressure (low bag-storage pile) produces
- (a) minimum amount of packing, to give
  - (1) fewer points of contact between particles, and
  - (2) less crystal knitting

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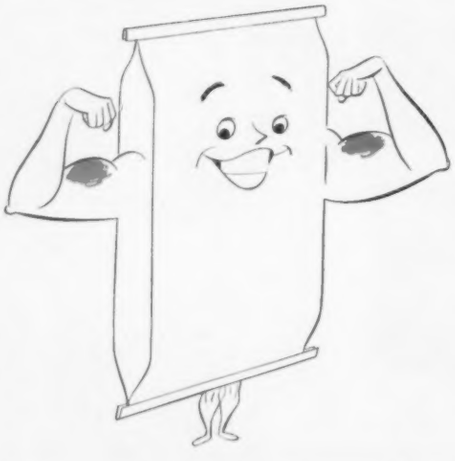
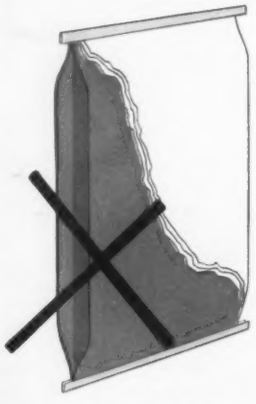


Could your multiwalls use a little more muscle on jobs for which they may now be a trifle light? Are you getting breakage . . . and complaints?



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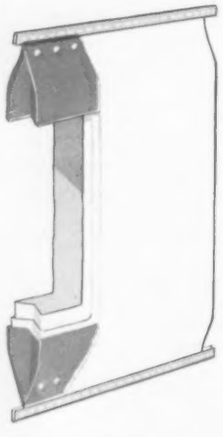

Or maybe your problem is that you're somewhat OVERpackaged. You could eliminate a full ply and, in its place, use Strength-End protection. And save *that* way.

Bemis Strength-End Multiwalls have been successfully used in all sections of the country and under all climatic conditions.

Ask your Bemis Man for the complete story . . . and examine the bag yourself. You'll quickly see its common-sense, balanced-strength construction . . . the solution to many problems of underpackaging and overpackaging.

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Use of Ammonia Liquors in Conventional Fertilizers Discussed by J. W. Lewis

Use of ammonia liquors in conventional fertilizers was covered in a paper by James W. Lewis, E. I. du Pont de Nemours & Co., Wilmington, Del. He explained that a series of progressive chemical reactions is started when ammonia, either as anhydrous or free ammonia in ammoniating solutions, is added to superphosphates. The extent and nature of these reactions depend primarily upon:

1. The amount of free ammonia added,
2. Temperature and storage time of the mixture, and
3. The moisture content of the mixture.

Since these chemical reactions significantly improve the physical condition of the superphosphates and mixed goods, it is therefore desirable to add the maximum amount of ammonia insofar as condition is concerned. However, beyond certain limits the ammoniation reactions produce basic calcium phosphates that are unavailable, i.e., P_2O_5 reversion occurs, even under the best storage conditions.

The combination of ammonia with acids or with calcium phosphates is a strongly exothermic reaction, i.e., heat is generated. Although high temperatures are helpful during the mixing cycle, removal of this heat is necessary before storage, if phosphate reversion and caking are to be minimized. It should also be recognized that aside from the ammoniation rate and temperature, reversion is very much dependent upon the P_2O_5 content of the mixed goods. As the P_2O_5 content is moved higher and as an effort is made to obtain all the nitrogen from solutions, this point may have been overlooked.

This situation results entirely from the fact that in a constant size sample (1 gm.) used for the citrate solubility test during the analysis, the ratio of the actual amount of P_2O_5 present to citrate solvent increases as the grade goes up. Obviously, there is twice as much P_2O_5 per unit volume of citrate in a 16% goods as in an 8% mixture. This means that less of the lesser soluble P_2O_5 is dissolved and the insoluble comes out higher.

One of the most important processing steps is the removal of the heat generated by the ammoniation reaction. By removing the heat, the amount of free ammonia added per unit of P_2O_5 can be increased significantly before reversion is encountered. The importance of this temperature effect on conventional goods cannot be over-emphasized. For ex-

Cover Many Aspects Food Manufacturing

ample, a 10% P_2O_5 grade, ammoniated at the rate of 4.5 lb. free ammonia per unit P_2O_5 and stored for several weeks without cooling, might show as much as 1.0 unit P_2O_5 reversion, whereas the same mixture cooled below 110° F. soon after ammoniation would show little, if any, loss of available P_2O_5. In general, for normally ammoniated conventional mixtures, 110° F. seems to be a dividing point, below which reversion reactions are greatly retarded and above which they increase in speed and extent in proportion to the storage temperature.

The moisture factor needs more than passing comment, for moisture is the "highway" over which most of these complex chemical reactions travel. The soluble salts largely responsible for the condition of the goods also move back and forth over this road. This shifting of the conditioning reactions in the free water present will determine the condition of the fertilizer at any given time.

In summary, the starting point in formulating conventional complete fertilizer mixtures is the selection of the amount of free ammonia to be used per unit P_2O_5. This depends upon:

1. The grade,
2. Past experience with the particular superphosphates,
3. Use of a cooler,
4. Expected storage time, and
5. What other formula ingredients are involved, especially those of a strongly alkaline nature (cyanamid, active limestone).

The rates of ammoniation recommended are three pounds free ammonia per unit P_2O_5 from triple and five pounds ammonia per unit for ordinary super. The lower limit of ammoniation is largely a question of physical condition while the upper limit is much less definable. As the rate of ammoniation is increased beyond four pound NH_3/unit P_2O_5, consideration must be given to phosphate reversion, absorption capacity of the particular superphosphate, mechanical equipment, grade of mixture and other factors. Rates beyond six pounds/unit for ordinary super should be considered as specific plant developments. Each manufacturer should determine the feasibility of such operations and he should plan on using a cooler following ammoniation.

Heat and Moisture "Twin Plagues" in Manufacture Of Non-Granular Mixtures

In his paper, "Semi-Granulation of Fertilizer," Elmer C. Perrine, Nitrogen Division, Allied Chemical Corp., New York, told a Round Table group that temperature of the product in the mixer should be at least 200° F., and that many operators preferred temperatures of 230° and some of 240°.

"Where high costs of ingredients and operating difficulties exist in semi-granulation, they often stem from the fact that high heats must be obtained in the mixer with low moisture levels, since all the granulation must take place in that one machine on a one-try basis," he said.

Semi-granulation could as well be termed "minimum equipment granulation," he said. It requires merely that sulfuric acid be added to the mix usually in conventional rotary batch mixers through a separate distributor pipe about duplicating the design of a good ammoniating distributor pipe.

The flights of the mixer should preferably, though not necessarily, be reduced in depth to about 12 inches in the one-ton and to 14 inches in the two-ton mixers. Refinements of worth are the use of meters replacing measuring tanks, particularly if one man is to manipulate the mixer as well as apply the liquids. Means should be provided for channelling off the considerable fumes sometimes released. One way to promote this is to have the discharge door remain open at least one-half inch during the mixing.

Heat and moisture are twin plagues in stored semi-granulated products as surely as in fully granulated ones. The cost of the minimum equipment for semi-granulation is very low, chiefly because no equipment is provided for drying or cooling. As a result, a very important difference in the products is the fact that much semi-granulated fertilizer is stored at and sometimes above the maximum water and heat content acceptable in full-scale granulating plants.

Due to the very high temperature of the product when made, there is considerable heat loss enroute to storage from the evaporation of some moisture and from radiation. When there is much drop through the air, this cooling may be considerable. Most operators find it necessary to recirculate the product through the system at least once, sometimes more, within one or two days, to reach a reasonable level of water and temperature content for storage.

Some are finding it advisable to avoid semi-granulating in hot weather, as these means of cooling and drying are then inadequate. To cope with these problems, some operators are adding one rotary kiln without artificial heat which dries from the contained heat in the product as well as doing some cooling. However, one pronounced merit of semi-granulation is its freedom from any costly equipment being added to the normal ammoniating plant. On the other hand, the semi-granulating system may also be the nucleus around which a full-scale granulating plant may later be assembled, without discarding much costly equipment.

One system that used a rotary dryer-cooler kiln without heat but with

Turn to **ROUND TABLE** page 29

PENOLA HAN® Heavy Aromatic Naphtha

its high solvency cuts costs... improves pesticides!

Cut costs and improve your pesticide with Penola HAN! This heavy aromatic naphtha offers ideal solvency for high quality products. Compatible with active ingredients, its excellent stability assures uniformity. Penola HAN will also promote consumer acceptance of your product through its exceptionally mild odor and light color.

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"Magnesium deficiency is becoming that's why I'm sold on your

Mr. George Lippincott, president, Dorchester Fertilizer Co. (left) and Basil Surgent, district sales manager, IMC, talk over the fertilizer situation.

Talk to your IMC representative about this year's SPM program. Find out how it can help your fertilizer sales

Several years ago, IMC launched a powerful sales program with this two-fold purpose: to *inform* growers, fertilizer manufacturers and influence people of the growing need for magnesium . . . and second, to *establish Sul-Po-Mag* as *the* way to add magnesium to the soil.

This program has been an outstanding success, and it is still gaining momentum. Magnesium is now recognized in many sections of the country as the fourth major plant food element. Fertilizer manufacturers throughout the land now include Sul-Po-Mag for magnesium in their complete mixed fertilizers.

The manufacturers who fortify their fertilizers with Sul-Po-Mag are supported by full-scale national and local advertising. Magazine ads, direct mail, radio commercials and publicity tell the SPM story to growers of tobacco, citrus, potatoes, fruits, vegetables and other crops. IMC supplies such local promotional materials as newspaper ad mats, tags, seal imprints, imprinted direct mail pieces and posters at no cost.

Let the SPM program sell extra fertilizer for you. Your IMC representative can show you how to use it to full advantage. Contact him soon, or write c/o the address at right.

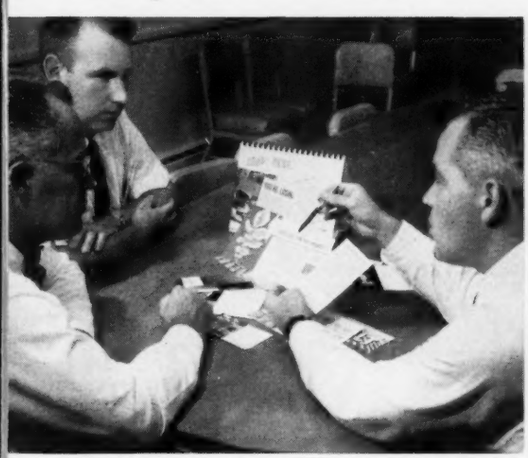
a real problem around here . . . Sul-Po-Mag program."

Sul-Po-Mag fills a fast-growing need on farms throughout the country. It's today's best source of magnesium. It's economical and easy to handle. Here's the story of the product and the promotional push behind it.

Here IMC district sales manager, Basil Surgent, discusses the Sul-Po-Mag program with Mr. George P. Lippincott, president, and Mr. John S. Neild, Jr., sales manager of the Dorchester Fertilizer Company, Cambridge, Md. Mr. Enos Valliant, chairman of the board, was not available when pictures were taken.

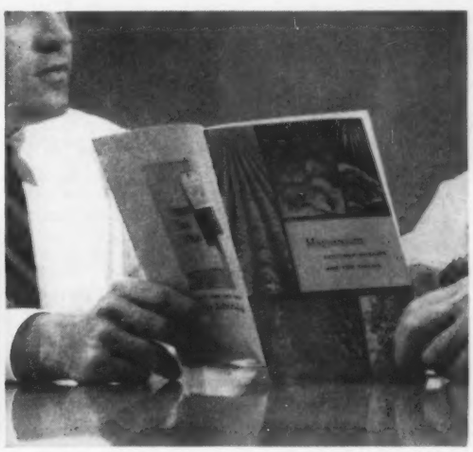
"Before showing you the 1960 SPM program, I'd like to point out that growers are really starting to recognize the need for magnesium. And Sul-Po-Mag in mixed fertilizers is now accepted as the way to protect against magnesium deficiencies."

"That's sure true here in our area, Basil. A good many of our customers buy only fertilizer containing Sul-Po-Mag. I think our SPM advertising . . . such as this merchandising package ...had much to do with increasing awareness."



"That's my point. This SPM program is getting the job done because every piece is packed with vital, up-to-date information. See how the pieces of this package pin-point magnesium needs by crops. Each leaflet can be imprinted with your name and address."

"This SPM poster can carry your company name...by imprinting your name and address on the material in the SPM program, it ties in with your total advertising effort. It helps establish *your brand* of fertilizer as the way to add magnesium to the soil."



"In answering requests, we send out this magnesium booklet. It tells the magnesium in agriculture story in detail . . . shows how Sul-Po-Mag in mixed fertilizers can help a variety of crops in all parts of the country."

"This Sulphate Bulletin keeps growers, vo-ag teachers, county agents, and extension people up-to-date in the need for sulphur, magnesium and potash. It's sent out quarterly from our home office. Manufacturers also receive the bulletin."

"Here's one of our most popular fertilizer grades. By making this fertilizer available with Sul-Po-Mag, we are helping our customers overcome magnesium deficiencies. It's just one of the "extras" that make our fertilizer a favorite with growers in these parts."

"You can count us in for 1960, Basil. The SPM program will move fertilizer for us. We know that by making Sul-Po-Mag available in Dorco mixed fertilizers, and letting folks know about it, we will profit from the growing demand for magnesium in our area."

50 IMC 1909 1959

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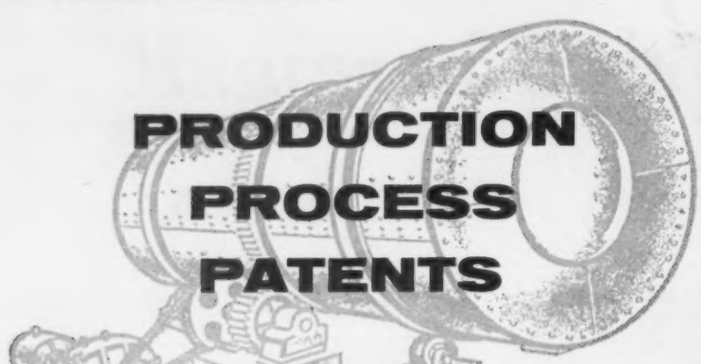


2,906,601

Preparation of Water-Soluble Nitrogen-Phosphoric Acid Compounds. Patent issued Sept. 29, 1959, to Alfred Koster, Dusseldorf-Oberkassel, and Friedrich Weldes, Dusseldorf-Benrath, Germany, assignors to Henkel & Cie. G.m.b.H., Dusseldorf-Holthausen, Germany. Process for the preparation of water-soluble, nitrogen-phosphoric acid compounds, which comprises contacting phosphorus pentoxide with a solid ammonium salt in a molar ratio of phosphorus to nitrogen of 1:1.25-3, whereby complete reaction occurs between the ammonia salt in solid state and the phosphorus pentoxide to provide said nitrogen-phosphoric acid compounds, and recovering the water-soluble, nitrogen-phosphoric acid compounds formed.

2,906,603

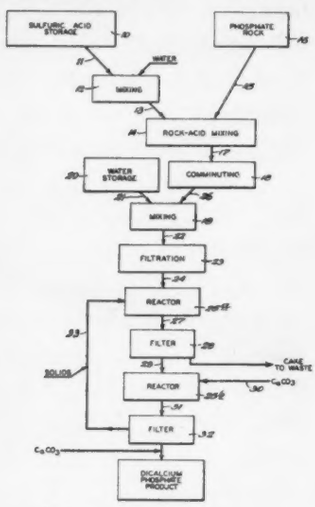
Process of Manufacture of Potassium Sulphate. Patent issued Sept. 29, 1959, to Jacques Lafont, St.-Gratien, France, assignor to Societe d'Etudes Chimiques pour l'Industrie et l'Agriculture, Paris, France. A method of producing potassium sulphate which comprises reacting in an aqueous medium potassium chloride with an alkyl ammonium sulphate having the formula

$(NHRR'R'')_2SO_4$

wherein R is an alkyl radical having from 1 to 4 carbon atoms and R' and R'' are selected from the group consisting of hydrogen and alkyl radicals having from 1 to 4 carbon atoms at a temperature not higher than about 55° C.

2,906,602

Method of Preparing Calcium Phosphates. Patent issued Sept. 29, 1959, to Joseph L. Purvis, Northbrook, Ill., assignor to International Minerals & Chemical Corp., Skokie, Ill. A process for preparing a defluorinated aqueous monocalcium phosphate solution which comprises reacting phosphate rock with sulfuric acid in proportions



to produce superphosphate, leaching the superphosphate with aqueous solution to produce a predominantly monocalcium phosphate solution, adjusting the P_2O_5 content of the solution to an amount in the range between about 10% and about 18% P_2O_5, adding to this solution in a first reaction stage the defluorination cake from the reaction of partially defluorinated solution and calcium carbonate, separately recovering a solid phase material of high fluorine content and a partially defluorinated phosphatic solution, adding to the partially defluorinated phosphatic solution fresh calcium carbonate in amounts such as to produce in the system a CaO/P_2O_5 mol ratio in the range between about 0.8:1 and about 1.2:1, and separately recovering a solids cake for use in the first reaction stage and an aqueous phosphatic solution of low fluorine content.

2,906,615

Process of Making Fertilizer from Poultry Droppings and Feathers. Patent issued Sept. 29, 1959, to Lloyd F. Dumore, San Diego, Cal. In a process of preparing a dry, granular fertilizer from a mixture of raw, untreated poultry droppings including poultry feathers embedded therein and loose feathers, the steps comprising drying the mixture, introducing nitrogen, phosphoric acid and potash of fertilizer value to the mixture during the drying step, pulverizing the resultant mixture to reduce it to small particle form, adding an organic syrup and additional quantities of nitrogen, phosphoric acid and potash of fertilizer value to said mixture, said organic syrup serving as a binder to hold the particles of the mix in separated granular relation, drying and screening said mixture, and collecting the finished product for commercial use.

2,906,744

Insecticidal Compositions. Patent issued Sept. 29, 1959, to Andrew T. Jancosek, Hammond, Ind., and John S. Brown, Flossmoor, Ill., assignors to Standard Oil Co., Chicago. A non-hygroscopic, free-flowing, substantially non-corrosive addition compound of thiourea and a polychlorinated cyclic organic insecticide selected from the class consisting of 1,1,1-trichloro - 2, 2 - bis(p-chlorophenyl) ethane, 1,1-dichloro-2,2-bis(p-chloro-

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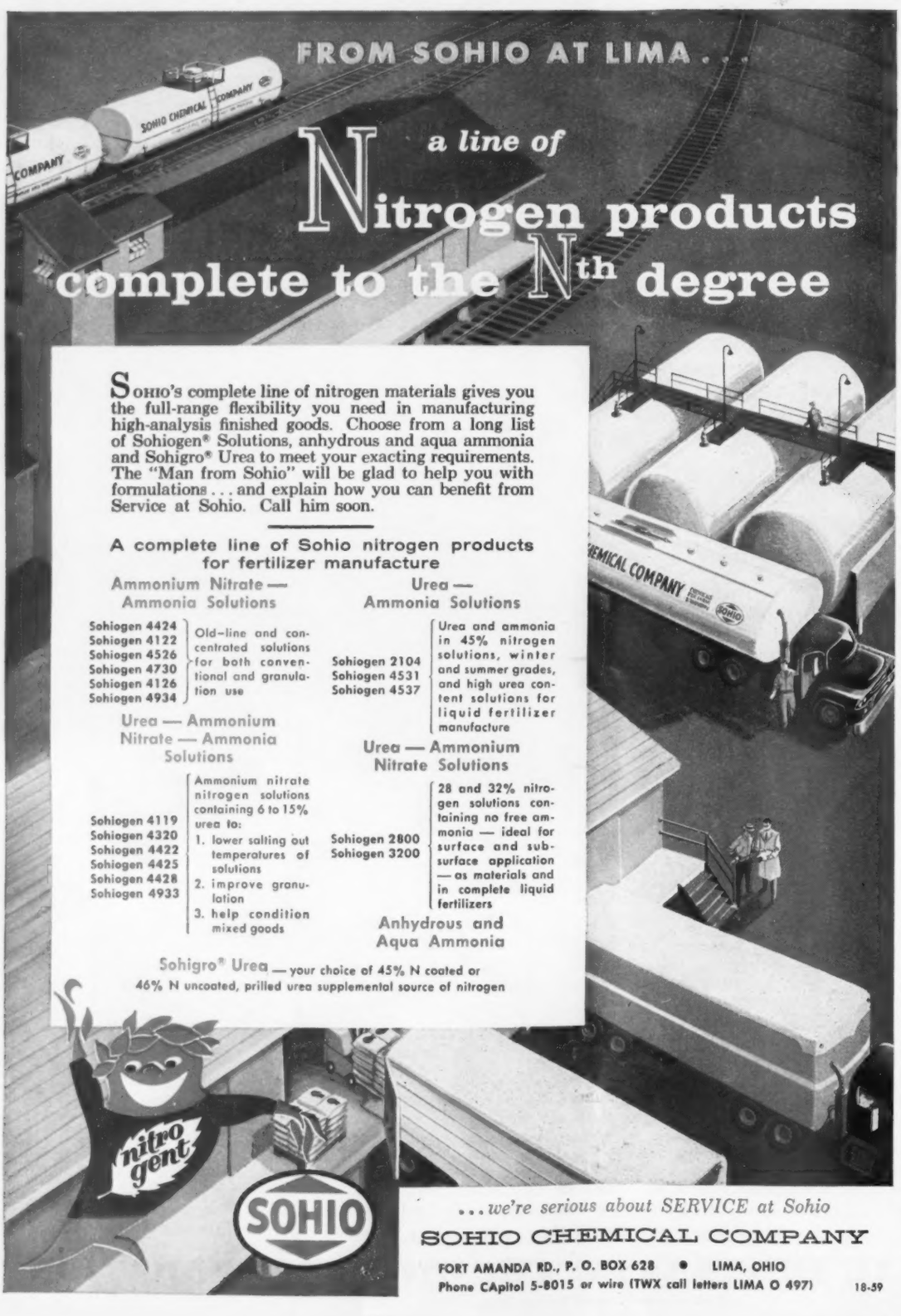
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Urea — Ammonia Solutions

Sohiogen 2104, Sohiogen 4531, Sohiogen 4537 — Urea and ammonia in 45% nitrogen solutions, winter and summer grades, and high urea content solutions for liquid fertilizer manufacture

Urea — Ammonium Nitrate — Ammonia Solutions

Sohiogen 4119, Sohiogen 4320, Sohiogen 4422, Sohiogen 4425, Sohiogen 4428, Sohiogen 4933 — Ammonium nitrate nitrogen solutions containing 6 to 15% urea to:
1. lower salting out temperatures of solutions
2. improve granulation
3. help condition mixed goods

Urea — Ammonium Nitrate Solutions

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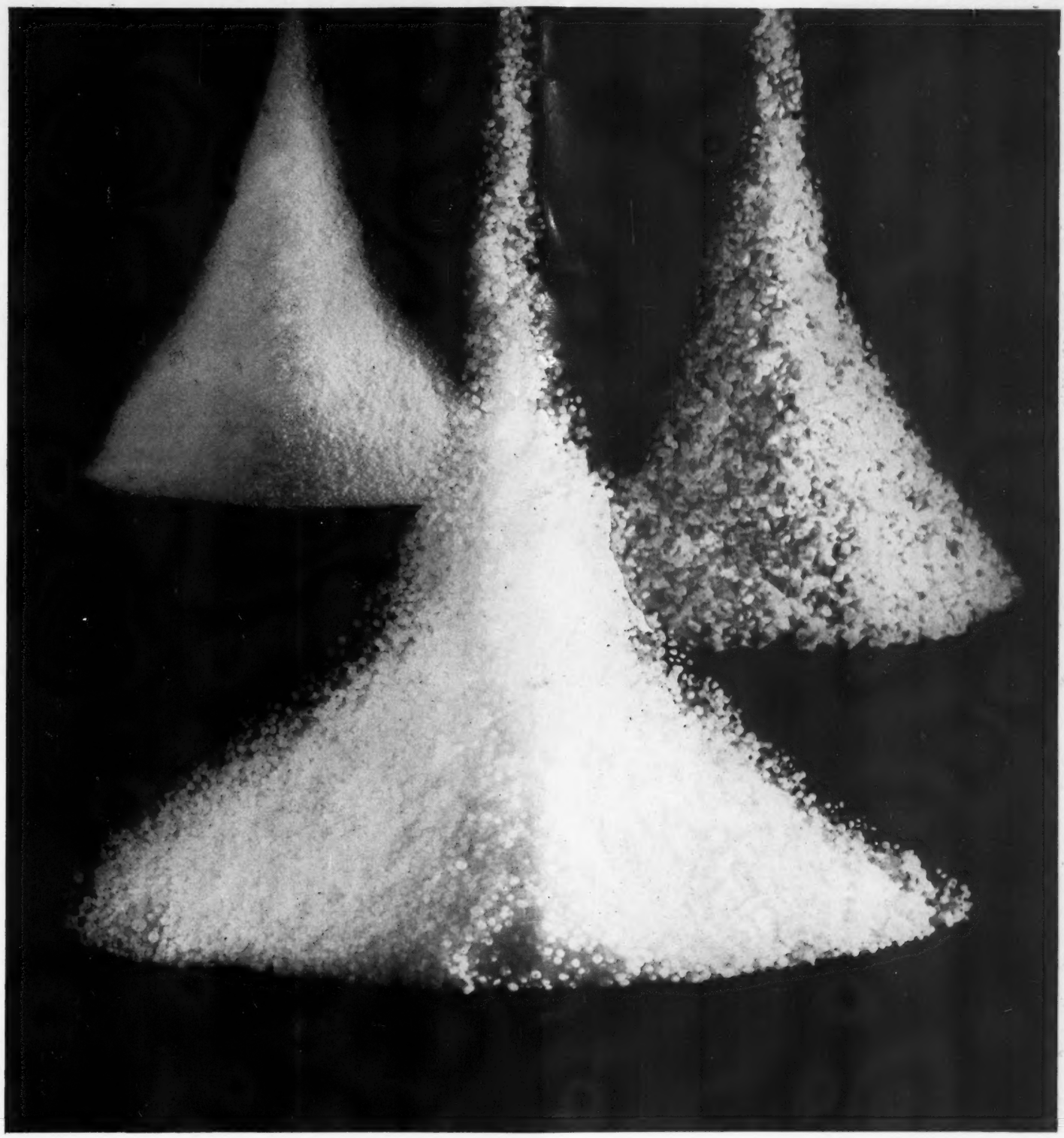
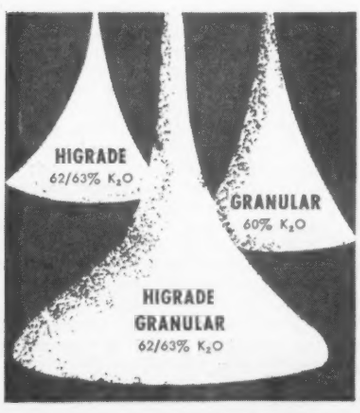


Better fertilizers begin with three non-caking grades of USP potash



USP's *three* outstanding grades of potash are specially refined to resist caking and remain free-flowing from manufacture to application. And all three are specially sized, too, in perfect grades to meet all modern fertilizer requirements. Two white grades—Higrade muriate and Higrade Granular muriate—each give you more potash per ton (62/63% K_2O) than any other potash available.

And USP's Granular muriate (60% K_2O) is ideal for products where a still larger particle size is required.

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PATENTS

Continued from page 14

phenyl)ethane, benzene hexachloride, 1, 1, 1 - trichloro - 2,2-bis(p-methoxyphenyl)ethane, 1, 2, 4, 5, 6, 7, 8, 8-octachloro-4, 7-methoxo-3a,4,7,7a-tetrahydroindane, 1,2,3,4,10,10-hexachloro-1, 4,4a,5,8,8a - hexahydro-1,4,5,8-dimethanonaphthalene, 1, 2, 3, 4, 10, 10-hexachloro-6, 7-epoxy-1, 4, 4a, 5, 6, 7, 8, 8a-octahydro - 1,4,5,8-dimethanonaphthalene, and mixed polychlorinated bicyclic terpenes.

2,906,671

Process of Producing Gibberellic Acid by Cultivation of Gibberella Fujikuroi. Patent issued Sept. 29, 1959, to Antony Borrow, Edward Garstang Jefferys, and Ian Stewart Nixon, Welwyn, England, assignors to Imperial Chemical Industries, Ltd., London. A metabolic process for the production of gibberellic acid by cultivating an active strain of Gibberella fujikuroi and checking active growth to thereby promote gibberellic acid production, wherein carbon availability is maintained during the gibberellic acid production stage by adding a source of carbon to the medium.

2,906,670

Process of Producing Gibberellic Acid by Two Stage Cultivation of Gibberella Fujikuroi. Patent issued Sept. 29, 1959, to Antony Borrow, Edward G. Jefferys, and Ian Stewart Nixon, all of Welwyn, England, assignors to Imperial Chemical Industries, Ltd., London. Process for the production of gibberellic acid which comprises carrying out the cultivation of the mould Gibberella fujikuroi (Fusarium moniliforme) in at least two stages, the first and any intermediate stages being stages of active growth of the said mould in a balanced medium containing a source of carbon and nitrogen, and the final stage being carried out in an unbalanced medium wherein the carbon/nitrogen ratio is higher than the ratio in which carbon and nitrogen are used up by the mould during active growth so that active growth is checked and gibberellic acid is produced.

2,905,597

Purification of Ammonia. Patent issued Sept. 22, 1959, to Joseph D. Stafford, Jr., and Carl E. Alleman, Dumas, Texas, assignors to Phillips Petroleum Co. A process for purifying ammonia contaminated with over 15 weight percent water and a substantial amount of dissolved mineral salts comprising rectifying said ammonia in the presence of sufficient antifoam agent to inhibit the carryover of contaminants with the overhead product, and recovering therefrom substantially pure ammonia.

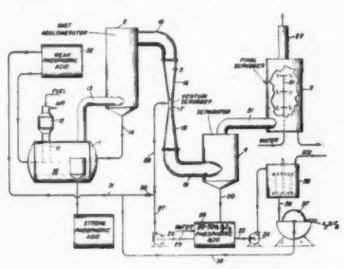
2,905,532

Method of Reducing the Caking of Ammonium Sulfate Crystals. Patent issued Sept. 22, 1959, to Joshua B. Thompson, Trail, B.C., Canada, assignor to the Consolidated Mining and Smelting Co. of Canada, Ltd., Montreal. In a process for the production of ammonium sulphate in which ammonium sulphite solution used for the absorption of sulphur dioxide from combustion gas is acidified with sulphuric acid to form ammonium sulphate solution, ammonium sulphate solution is evaporated to produce a suspension of ammonium sulphate crystals in ammonium sulphate solution and ammonium sulphate crystals are separated from the ammonium sulphate solution, the improvement which comprises spraying the ammonium sulphate crystals with a solution which contains an alkyl aryl sodium sulphonate in amount sufficient to provide from about 0.005% to about 0.05% of an alkyl aryl sodium sulphonate by weight of the ammonium sulphate crystals and thereafter drying the ammonium sulphate crystals treated with an alkyl aryl sodium sulphonate.

2,904,425

Method of Making Lime-Containing Fertilizers and Especially Slag Lime. Patent issued Sept. 15, 1959, to Otto Kippe, Osnabruck, Germany, assignor to Paul Tobeler, doing business under the name of Trans-Oceanic, Los Angeles, Cal. The method of converting coarse, moist blast furnace slag from an openly exposed moist slag heap into usable plant fertilizer so as to obviate any calcination of the slag, said slag containing 5% to 30% moisture, that includes initially completely drying the moist slag by adding thereto only unslacked calcium oxide in the proportions 20 to 100 weight parts of calcium oxide per 100 weight parts of moist slag and calcium oxide until the entire mix becomes dry and the calcium oxide content of the mix is raised to at least 45% by weight, and then grinding said coarse dry mix to fine particle size for use as a spreadable fertilizer.

2,905,535



Phosphoric Acid Concentration. Patent issued Sept. 22, 1959, to Sydney Atkin, Springfield, N.J., and Sidney S. Prince, New York, assignors to Chemical Construction Corp., New York. A method of concentrating a dilute impure aqueous phosphoric acid containing compounds of silicon and fluorine as impurities to a product phosphoric acid while simultaneously eliminating said impurities which comprises establishing in a drum-type concentrator a body of dilute phosphoric acid having a 20-35% P_2O_5 content, passing a stream of hot gas through the dilute impure phosphoric acid in a concentrating step whereby hot gas introduced into the body of said dilute phosphoric acid produces a product phosphoric acid having a P_2O_5 content of at least 50% and a stack gas containing said impurities along with volatilized phosphoric acid and water vapor, said stack gas leaving the phosphoric acid being concentrated at a temperature of between 225° F. and 275° F., thereafter scrubbing said stack gas with an aqueous phosphoric acid having a P_2O_5 content of at least 20% and not over 35% thereby removing said volatilized phosphoric acid from said stack gas while dissolving limited quantities only of silicon- and fluorine-containing compounds therein, and recycling a portion of the resulting scrubbing liquid to the concentrating step.

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Arcadian® News

Volume 4 | For Manufacturers of Mixed Fertilizers | Number 11

Technical Tips for Better Ammoniation

THE RIGHT COMBINATION TO MEET FORMULA NEEDS

Whether you produce low-anaylsis or high-analysis fertilizers in pulverized, granular, or semi-granular form, you have many different ARCADIAN® Nitrogen Solutions from which to select those best suited to your ammoniation needs.

Making the most advantageous selection is not always a simple matter. It can be a perplexing problem to choose the right combination of solutions and other ingredients to produce the weights and plant food ratios that are desired, and to control moisture and keep costs down.

This is true even in the production of fertilizer from which moisture is not to be removed. It becomes an even more complicated problem as the analyses are raised and when moisture is to be removed, as in granulation . . . or, held to a low level, as in semi-granulation.

The table below shows how such problems are solved, using three different NITRANA Solutions as examples. Many other combinations and complexes are obtainable with these and other ARCADIAN Nitrogen Solutions.

The table shows how to get a specific ratio of nitrogen to phosphoric acid within definite weight limits. Three different NITRANA Solutions are shown combined with superphosphates and sulphuric and phosphoric acids. For efficient use of this table, you can find the pounds of neutralizing ammonia per unit of nitrogen in each Solution listed on the back page of this issue of The ARCADIAN News.

The formulation you need may demand the maximum of 20% superphosphate for its low cost P_2O_5 combined with its ability to react with much ammonia thereby also holding the cost of nitrogen to a low point in the formula. A considerable amount of phosphoric acid may be justified for its economy of weight in total plant food when reacted with nitrogen solutions.

The table shows that supplying one unit of P_2O_5 with 20% superphosphate

(Continued on following page)

MATERIALS COMBINED AMMONIATION RATES	BASED ON ONE UNIT	NITRANA 2 TOTAL LBS. PRODUCT	% N	% P_2O_5	TOTAL %	NITRANA 2M TOTAL LBS. PRODUCT	% N	% P_2O_5	TOTAL %	NITRANA 3 TOTAL LBS. PRODUCT	% N	% P_2O_5	TOTAL %
Superphosphate 20%	P_2O_5												
6.0% H_2O													
6.0 lbs. NH_3/Unit P_2O_5													
***WET TOTALS**		**127.0**	**8.7**	**15.8**	**24.5**	**125.2**	**8.8**	**15.9**	**24.7**	**122.8**	**7.6**	**16.3**	**23.9**
DRY TOTALS		117.5	9.4	17.0	26.4	117.5	9.4	17.0	26.4	112.6	8.3	17.8	26.1
Triple Super. 47%	P_2O_5												
3.0% H_2O													
3.0 lbs. NH_3/Unit P_2O_5													
***WET TOTALS**		**56.1**	**9.9**	**35.6**	**45.5**	**55.2**	**10.0**	**36.2**	**46.2**	**54.0**	**8.7**	**37.0**	**45.7**
DRY TOTALS		53.1	10.4	37.7	48.1	53.1	10.4	37.7	48.1	50.6	9.2	39.5	48.7
Sulphuric Acid 66° Be	N												
93.19% Acid													
3.1 lbs. Acid/lb. NH_3													
***WET TOTALS**		**82.2**	**24.3**	**0.0**	**24.3**	**78.9**	**25.3**	**0.0**	**25.3**	**88.5**	**22.6**	**0.0**	**22.6**
DRY TOTALS		73.6	27.2	0.0	27.2	73.6	27.2	0.0	27.2	76.9	26.0	0.0	26.0
Phosphoric Acid	P_2O_5												
75% Acid													
54.3% P_2O_5													
7.2 lbs. NH_3/Unit P_2O_5													
***WET TOTALS**		**69.2**	**19.2**	**28.9**	**48.1**	**67.1**	**19.8**	**29.8**	**49.6**	**64.2**	**17.4**	**31.2**	**58.6**
DRY TOTALS		55.9	23.8	35.8	59.6	55.9	23.8	35.8	59.6	50.0	22.4	40.0	62.4

*INCLUDES WATER IN ALL MATERIALS

neutralized with 6 pounds of ammonia from NITRANA 2M adds about 117.5 pounds dry weight. The product should analyze about 9.4% N and 17% P_2O_5 and have a total of 26.4% plant food. Ratio of N to P_2O_5 would be about 1 to 1.81.

A great increase in plant food concentration results when one unit of P_2O_5 is supplied by 75% phosphoric acid (54.3% P_2O_5) and this acid is neutralized with 7.2 pounds of ammonia from NITRANA 3. Only about 50 pounds dry weight is involved and the product would analyze about 22.4% N, 40% P_2O_5 and 62.4% total plant food. Ratio of N to P_2O_5 would be about 1 to 1.79.

Further flexibility in economy, heats generated, concentration of plant foods, and influence on condition for desired effects are achieved in using triple superphosphate or sulphuric acid for neutralizing the ammonia.

Heat of ammoniation varies greatly with different materials, as shown below. The proper amount of heat aids moisture removal and granulation. To raise one ton of fertilizer 1°F., requires 500 B.T.U.'s. Evaporation of one pound of water absorbs about 1040 B.T.U.'s, which would cool a ton of fertilizer about 2°F.

Heat Generated by Reacting Ammonia

Material	B.T.U.'s of Heat per Pound of Ammonia
Superphosphate 20% P_2O_5	1460
Triple Superphosphate	1540
Phosphoric Acid	1900
Sulphuric Acid	2940

Nitrogen Division Technical Service is always ready to help you with specific ammoniation and formulation problems. Write Technical Service, Nitrogen Division, Allied Chemical, 40 Rector Street, New York 6, N. Y.

PRECAUTIONS FOR HANDLING NITROGEN SOLUTIONS

Accidents that occur during the handling of nitrogen solutions are usually the result of taking short cuts in procedure, carelessness, or lack of knowledge of certain characteristics of nitrogen solutions. Specifically, there are *four areas* where plant management should concern itself with the establishment and strict enforcement of safe practices.

No. 1—Personal Safety Equipment

Most nitrogen solution plants provide their operators with protective equipment, but, unfortunately, do not make sure that it is used. Regular inspections of safety equipment and its use should be instituted, and the employee should be made responsible for the condition of this equipment.

Nitrogen solutions do not have the strong caustic properties of some of the other materials handled in fertilizer plants, such as sulphuric acid or anhydrous ammonia. However, an operator should be provided with a good set of goggles or a full-face mask if he works in an area where gauge or rotometer glasses might break, or a line might rupture.

Connecting and disconnecting tank cars is a job that demands adequate personal safety equipment. Here, the men are working in a rather limited space, high above the ground, with limited opportunity for emergency exit. Obviously, proper safety equipment should be provided for two reasons: first, of course, as protection against contact with the solution; second, to prevent panic which may result in a fall causing injuries more serious than those brought about by contact with the solution. This equipment includes: full-face gas masks with speaking diaphragms, gauntlet-type chemical-resistant gloves, and a chemical-resistant apron. A long sleeve cotton shirt is recommended to cut down exposed skin area.

Gas-mask canisters should be replaced periodically, even though they may not have been used in an ammonia atmosphere. These canisters carry a date which should be respected. Even an experienced man could panic if he found that the gas mask he trusted had suddenly filled up with ammonia gas.

Plant managers would do well to insist that connection and disconnection of tank cars be handled by two men—one to do the job and the other to stand by to give aid in an emergency. For example, when connecting a tank car, the safety man should be stationed on the ground with a fire hose. In the event of a broken connection, he would be able to direct a stream of water on it immediately, to minimize the danger.

Needless to say, steps should be taken to see that tank cars are not disturbed once hose connections have been made. Place a "tank-car-connected" sign and a derail device ahead of the car. Make sure car brakes are set. When the car is not actually being unloaded, don't allow hoses to remain connected or valves on the car to remain open. If unloading takes place at night, make certain that the area around the car is well lighted, so that switching crews can see that the tank car is connected.

After unloading, make sure that the tank car is completely disconnected and ready to go before telling the switch crew to pull it out. It's no easy matter to close valves on a tank car while a hose under 40 to 50 lbs. pressure is whipping about, spraying solution.

No. 2—Safety in Production Equipment

Failure of plant equipment is another source of danger. The entire solution system should be constructed of the best materials available. It pays to follow the solution supplier's recommendations to the letter—and then assume a real possibility of failure. With this attitude, a plant's preventive maintenance program becomes an accident prevention program as well.

Care should be exercised when choosing equipment. For example, carbon steel is often used for solutions handling systems. This is not good practice. There are other materials, readily available, that are much more satisfactory. These include: aluminum and most aluminum alloys, including 5052, 5154, and 6061; stainless steels including Types 304, and 316; and rubber, Neoprene, polyethylene, vinyl resins and glass. Among the materials destroyed rapidly, and to be avoided under *all* circumstances are: copper, brass, bronze, Monel, zinc, galvanized metals, conventional die castings, concrete, and most alloys that contain any of the above materials.

When nitrogen solutions evaporate, they leave a salt residue. It is important, therefore, to pick valves, such as pressure relief valves, that will operate even though they contain salt deposit. Indeed, pressure relief valves should be operated periodically, to make sure they are functioning.

It is important to consider the materials from which valves and fittings are made. For example, aluminum will not stand the physical abuse that carbon steel and stainless steel can. So, in aluminum installations, it is best to locate stainless steel valves at critical points, such as on storage tanks. Wherever a line will be connected and disconnected quite often, stainless steel threaded connections should be used.

Where there are diaphragm type valves, inspect and replace diaphragms regularly. This helps avoid the hazard of replacing a ruptured diaphragm while the system is full of solution and under pressure. Unloading hoses should have bleed valves, or the system designed so that the operator can safely bleed off pressure before disconnecting.

It never pays to skimp on hose—for

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hoses undergo rough handling, deterioration and high pressures. Where a plant is using high pressure nitrogen solutions, it would be well to consider anhydrous ammonia hose. However, regardless of the type used—and in the absence of hydrostatic testing—all hoses should be replaced periodically, for it is difficult to see a weak place or break with normal inspection.

No. 3—Safety in Repairs and Salvage

The area of repair and salvage has even greater potential hazard than exists in routine production procedures. For example, a very dangerous repair practice is the use of a welding or cutting torch on equipment, particularly steel, that has been in nitrogen solution service.

In an actual case, an operator attempted to make a repair weld on the outside of a steel storage tank that had a leak in its upper portion. Shortly after he started, the tank began to heat up further away from the weld area than would normally be expected. Then the pressure relief valve opened, allowing dense fumes to escape. The local fire department was called. By the time they arrived and put a stream of water on the tank, it had gotten *red hot* above the solution level. Whether it was due to the cooling effect of the water or the material in the tank burning itself out, the heat gradually subsided, and no explosion occurred.

Now here is what caused this dangerous situation. As solution was used and the level in the tank dropped, solution clinging to the sides of the vessel evaporated, causing ammonium nitrate to be deposited. As fertilizer producers know, sufficient heat will cause ammonium nitrate to decompose in a self-sustaining reaction. Decomposition itself is a relatively slow reaction but the fumes evolved can soon build up tremendous pressure, particularly if confined in a limited space. Since ammonium nitrate does have a self-sustaining decomposition and a separate oxygen supply is not required, it is impossible to smother this type reaction. The only way to stop it is to cool the ammonium nitrate adjacent to the decomposing ammonium nitrate to a point where the heat supplied will not be sufficient to raise the unreacting ammonium nitrate to its decomposition point.

Another case involved an abandoned steel pipe that had been in solution service. All of the pipe had been taken down, with the exception of a 25-foot length hanging along an unloading platform. An air line ran just below this pipe. Years later, in the winter, the air line froze. Attempting to thaw it, a laborer ignited a bucket of waste and set it under the air line. Unfortunately the abandoned solution line ran right through the flame. Shortly thereafter, a terrific explosion occurred. Part of the unloading platform was torn out and flying steel severed a hose lying 150 feet away. Luckily, no one was in the area at the time.

Several safe operating practices should be apparent from the foregoing. First of all, *never* apply heat to thaw or repair any equipment used for handling nitrogen solutions if it can possibly be avoided. Occasionally a steel tank may spring a leak which may be fixed by welding. However, if a steel tank has corroded that much in one spot, the chances are that it would be unsuitable for use even after patching. If it is necessary to weld a tank—and even aluminum tanks sometimes need welding—the tank should be completely emptied of all materials and thoroughly washed with water until free from ammonia fumes. When it is safe for a man to enter the tank, have him use wire brush, chipping hammer and water to clean a large area where the weld is to be made. If, during the welding, any indication is given of the possible decomposition of ammonium nitrate, flood the entire area with water immediately to cool it down. Always keep men outside the tank to assist the welder. Have a harness around the welder's waist so that he can be pulled out if necessary. Have extra help nearby to remove the man quickly.

Under no circumstances should open flames or other sources of high localized heats be used to thaw nitrogen solution pipe lines. Use hot water. As for welding pipe, it's difficult to think of a situation where the cost saved by repairing a bad pipe line can be justified by the risk involved.

New fertilizer manufacturing techniques have brought about an increased use of sulphuric acid in the fertilizer mixer. Occasionally, because of the convenience of such an arrangement, equipment will be installed with the sulphuric acid and nitrogen solution systems connected. This can be an unsafe practice. Some situations may appear to be harmless, but there are many possibilities for dangerous arrangements: viz. connecting the vent pipes of acid and solution tanks together to economize on safety valves and piping.

When laying out systems such as these where a potential hazard may exist, you cannot be too careful. For example, even batch tanks, with their exposed gauge glasses, are a source of potential danger. Protect gauge glasses with shatter-proof glass or plastic guards. It's wisest to use integrating type meters of stainless steel. These are entirely suitable for batch type operations, and are available today at relatively low cost.

Another design defect is the absence of pressure relief valves in anhydrous

(Continued on following page)

(Continued from preceding page)

ammonia pipe lines. Because the coefficient of expansion of liquid ammonia is so high, it is essential to locate a pressure relief valve at any place in an anhydrous ammonia system where there is a possibility of trapping liquid ammonia between two closed valves.

No. 4—On-the-Spot Emergency Aid

Plant management should see to it that emergency showers are installed in operating areas. Make sure that this equipment is usable throughout the year and does not have to be turned off during freezing weather. Men working in close proximity to nitrogen solutions, anhydrous ammonia and acids have the right to expect emergency aid near at hand if the need arises. See that they have it!

To sum up the case for safety—nearly all the liquid materials used in fertilizer manufacturing operations can be *hazardous* materials. So, look over *your* plant layout. Make modifications to minimize or avoid these hazards. Install safety equipment. Instruct your operators on how to handle these materials properly. Give them the necessary protective equipment . . . and *insist* that they use it. Then assume that there *will* be accidents and provide emergency treatment facilities in the area, so that aid can be administered promptly.

Arcadian®

NITROGEN SOLUTIONS

	CHEMICAL COMPOSITION %						PHYSICAL PROPERTIES		
	Total Nitrogen	Anhydrous Ammonia	Ammonium Nitrate	Urea	Water	Neutralizing Ammonia Per Unit of Total N (lbs.)	Approx. Sp. Grav. at 60°F	Approx. Vap. Press. at 104°F per Sq. In. Gauge	Approx. Temp. at Which Salt Begins to Crystallize °F
NITRANA®									
2	41.0	22.2	65.0	—	12.8	10.8	1.137	10	21
2M	44.0	23.8	69.8	—	6.4	10.8	1.147	18	15
3	41.0	26.3	55.5	—	18.2	12.8	1.079	17	-25
3M	44.0	28.0	60.0	—	12.0	12.7	1.083	25	-36
3MC	47.0	29.7	64.5	—	5.8	12.6	1.089	34	-30
4	37.0	16.6	66.8	—	16.6	8.9	1.184	1	56
4M	41.0	19.0	72.5	—	8.5	9.2	1.194	7	61
6	49.0	34.0	60.0	—	6.0	13.9	1.050	48	-52
7	45.0	25.3	69.2	—	5.5	11.2	1.134	22	1
URANA®									
6C	43.0	20.0	68.0	6.0	6.0	9.3	1.180	12	39
6M	44.0	22.0	66.0	6.0	6.0	10.0	1.158	17	14
10	44.4	24.5	56.0	10.0	9.5	11.0	1.114	22	-15
11	41.0	19.0	58.0	11.0	12.0	9.2	1.162	10	7
12	44.4	26.0	50.0	12.0	12.0	11.7	1.087	25	- 7
13	49.0	33.0	45.1	13.0	8.9	13.5	1.033	51	-17
15	44.0	28.0	40.0	15.0	17.0	12.7	1.052	29	1
U-A-S®									
A	45.4	36.8	—	32.5	30.7	16.2	0.932	57	16
B	45.3	30.6	—	43.1	26.3	13.5	0.978	48	46
Anhydrous Ammonia	82.2	99.9	—	—	—	24.3	0.618	211	-108

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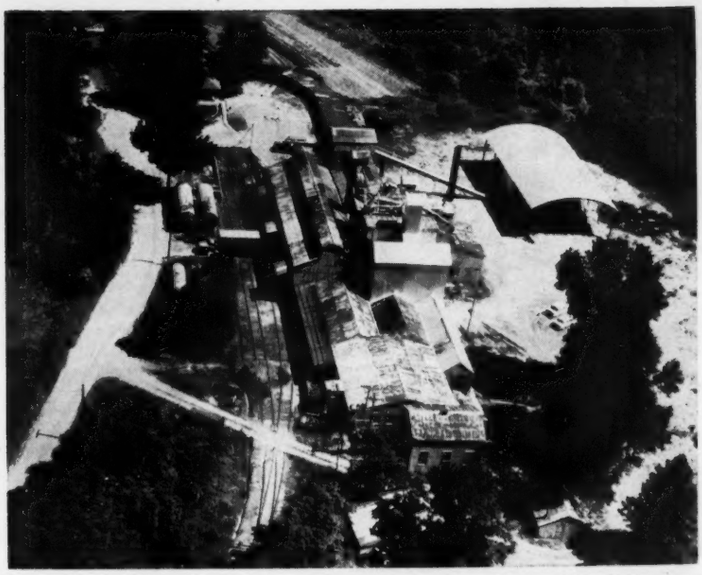

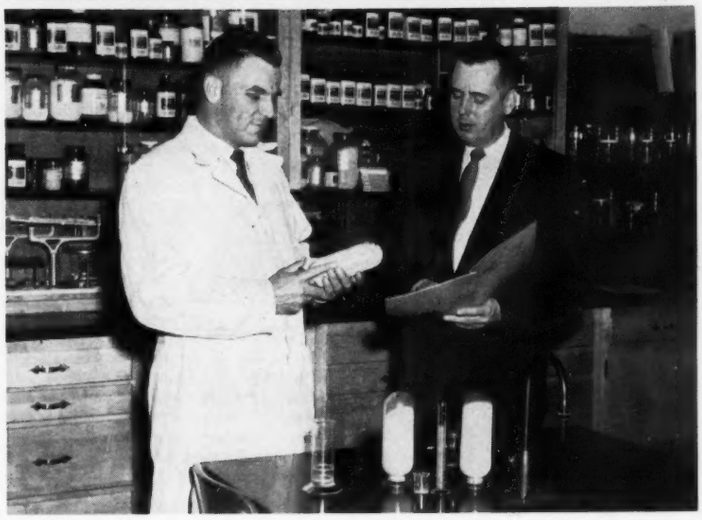

MINING SITE—Above is aerial view of mining facilities of Star Enterprises, Inc., at Olmstead, Ill., near the Ohio River. Arched-roof building at right receives raw clay which is sent to refinery via covered conveyor. The new reserve plots totaling 420 acres and said to ho'd some 5½ million tons of uniform product, are only a mile from the present mining location. Below: John P. Norton, sales manager, left and Edward Lowe, president of Star Enterprises, Inc., discuss sample of product at firm's laboratory at Cassopolis, Mich.

Two New Clay-Bearing Plots Acquired by Michigan Firm

CASSOPOLIS, MICH. — Star Enterprises, Cassopolis, has announced the acquisition of two additional plots of clay-bearing land near Olmstead, Ill., to be used as a reserve source for its mining operations. The firm produces Montmorillonite clays for use in agriculture, industry and for household use.

The new acreages are of 253 and 167 acres, respectively, according to Edward Lowe, president. Mr. Lowe said that test drillings indicate the average depth of high quality clay is about 30 feet, which he estimates will provide a reserve of some 5½ million tons of uniform product. He added that tests made by the State of Illinois indicate uniformity throughout the area.

The new plots are only about a mile from the company's present plant which is still operating on the original 75-acre site from which Fuller's earth has been produced for many years. The equipment was originally owned and operated by Sinclair Oil Co.

In commenting on the recent acquisition, Mr. Lowe said that the additional 420 acres will assure a continuing supply for the future. "We are fortunate to have access to this area because of its proximity to the existing plant and also from the standpoint of location for shipping in any direction," he observed. "Long frontage on the Ohio River is another possible asset for inexpensive shipping."

The company markets its product under the trade name of "Creek-O-Nite" for the agricultural trade.

Davidson-Kennedy Names Sales Representative

ATLANTA, GA. — Davidson-Kennedy Co., Atlanta, Ga., have appointed Harrold Kitchens as manufacturers' sales engineer. Mr. Kitchens will also represent Davidson - Kennedy Associates Co., Chicago Heights, Ill., engineers and constructors. He will have offices in Macon, Ga.

Mr. Kitchens

Mr. Kitchens has had many years experience in the industry both in sales and technical capacities. Prior to his appointment by Davidson-Kennedy Co. and Davidson-Kennedy Associates Co., he was associated with fertilizer engineering and manufacturing firms in the South and Midwest.

Commercial Production Of Calcinated Phosphate Rock Starts in Idaho

MONTPELIER, IDAHO—Commercial production of calcinated phosphate rock is now being processed by the San Francisco Chemical Co., Montpelier, Idaho. This is the Dorr-Oliver burning treatment whereby the organic content in the rock is burned out. The residue then results in an upgraded product, reports Virgil Givens, sales manager of San Francisco Chemical, as well as an "ideal feed for phosphoric acid producers."

The firm has been experimenting with calcination since 1957 until late summer, when commercial production was begun.

The finished product is pulverized, and sold in powdered form in bulk in all western states except Alaska and Hawaii, and in western Canada. The calcinated phosphate has now completely replaced San Francisco Chemical's previous natural mine run ore. The latter, according to Mr. Givens, was subject to the fluctuations in quality normally associated with direct use of a mine run product.

A new plant has been completed in Leefe, Wyo., some 40 miles distant, to produce not ony the calcinated product but also beneficiations of natural phosphate rock. Leefe has been chosen as the site since it is close to the natural source of phosphate.

Installed in the plant is a complete Dorr-Oliver fluo-solid facility.

The beneficiation facility uses flotation, which also produces an upgraded phosphate rock concentrate. This product is used in the manufacture of phosphate fertilizer, and has been developed by the firm over the past two years. This process too is also being handled commercially for the first time in the west.

The changeover is complete and "only technically controlled phosphate rock products" are now produced by the firm, says Mr. Givens.

"We have completely given up the shipment of natural ore."

General manager of the Leefe operation is Preston Pugmire, who has been with the company for about 15 years. D. L. King is president and general manager.

Agriform Hixon Moves Plant in California

CORCORAN, CAL. — Agriform Hixon, Inc., has moved its plant two miles north along the Central Valley Highway, to just north of the city of Corcoran, near Fresno, Cal.

Purpose for the move is twofold: to give up leased land and warehouse space in favor of company owned, and to expand processing operations.

Don Hixon, president, reports that the new building measures about 60 by 120 ft., and warehouse space previously rented has now been given up. The firm is converting anhydrous ammonia to aqua ammonia, and expects to add other products sometime during early 1960. No announcement has been made on what the new fertilizer mixtures will be.

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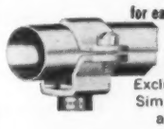

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Potash Situation Discussed At Solutions Convention

By EDWIN C. KAPUSTA*
U.S. Borax & Chemical Corp.
New York, N.Y.

In this discussion of the anticipated potash supply situation for the remainder of the present fertilizer year, consideration is given to the total supply of potash materials of all types which may be available and, of more immediate concern to producers of liquid fertilizers, the possible supply of the specific types of potash products used by this segment of the fertilizer industry. Attempting to forecast the future supply of potash with any degree of certainty at this point in the fertilizer year is most difficult. As with any forecast, the statements expressed here are subject to change with variations in domestic and world conditions.

The anticipated total potash supply picture may be put into better perspective by examining briefly the individual factors which relate to the determination of the net supply of any commodity for a given period; namely, stocks on hand at the start of that period and production during that period, making allowances for imports and exports.

A better understanding of the present situation might be drawn by reference to the supply situation of the preceding fertilizer year, a year in which consumers of potash products witnessed little, if any, difficulty in obtaining deliveries of the types of products they wanted when they wanted them.

According to figures recently released by the Bureau of Mines, stocks in producers' hands June 30, 1958, (the start of the 1958-59 fertilizer year) totaled approximately 794,000 tons of marketable potassium salts, equivalent to about 473,000 tons of K_2O. Production in the United States during 1958-59 was reported as 3.78 million tons of salts containing 2.232 million tons of K_2O. According to this source, total sales of domestically produced potash salts were 4.128 million tons; about 519,000 were exported. Bureau of Census figures indicate that imports of approximately 514,000 tons of potash salts closely counter-balanced exports during that period. Apparent domestic consumption, quantity sold or used by producers plus imports minus exports, in the year ended June 30, 1959 was reported to be 4.123 million tons of potash salts, containing 2.4 million tons of K_2O.

According to another source, the American Potash Institute, total deliveries of all potash salts for all purposes in 1958-59, by North American producers and importers, totaled approximately 4.6 million tons of products containing an equivalent of 2.7 million tons K_2O. These deliveries represented an increase of 18% over those of the previous year.

Largely because of this pronounced increase in deliveries, potash inventories at the start of the present fertilizer year were considerably below those on hand at the start of the preceding year.

According to the Bureau of Mines, stocks in producers' hands on June 30, 1959 were at the lowest level since 1953. No significant increase in North American potash productive capacity is expected to take place this year which could materially affect the quantity of potash which could be made available. The quantities of potash materials which may be exported or imported this year are extremely difficult to forecast because of their susceptibility to changes in world market conditions.

Some trends, however, have been noted, which may indicate an increase in the quantity of potash salts to be exported. The picture relating to imports is even less clear, although some sources have expressed belief that imports are currently running slightly ahead of last year's levels, possibly indicating that imports may be up slightly over those of the preceding year.

If these assumptions:

1. Lower inventories on hand than those at the start of the preceding year,

2. Productive capacity approximately equivalent to that of the preceding year,

3. Prospect of increased exports and

4. Slight increase in imports prove to be valid, then it would appear that potash supply and demand may be in much closer balance than in recent years. This statement is, of course, predicted on the further assumption that the market demand for fertilizer and chemical grade potash will be at least equivalent to that experienced in the past year. Should market demand increase significantly it is even conceivably possible, but perhaps not too probable, that some potash products may be in somewhat tight supply at periods of peak movement in the present year.

According to figures just released by the American Potash Institute, deliveries of agricultural potash products, during the first quarter of the present fertilizer year, were approximately 1% under those for the comparable period last year. This includes deliveries in the continental U.S., Canada, Cuba, Puerto Rico and Hawaii. Import figures were not available for inclusion in this delivery figure.

Deliveries of potash materials for non-agricultural purposes during this period were, however, about 14% higher than last year. Exports to areas not listed above were up significantly, about 23%. Total first quarter (1959-60 fertilizer year) deliveries of potash salts for all purposes were approximately 3% higher than those for the first quarter of last year.

The discussion up to this point has dealt with various aspects of the supply and demand situation for potash products for both agricultural and non-agricultural purposes. Of specific interest to producers of liquid fertilizers is the possible supply of those somewhat specialized

*Presented at the National Fertilizer Solutions Convention, St. Louis, Mo., Nov. 10, 1959.

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products which are used in the preparation of liquid mixtures.

Potash products are marketed in several technical and agricultural grades, which vary in chemical composition, physical form, and price. The liquid fertilizer industry, however, employs primarily the higher purity, finely-divided, white crystalline agricultural muriate of potash which combines the necessary product use characteristics with competitive price. Technical or chemical grade muriate of potash products may be used in this application; however, these materials command a premium price and are considerably more subject to caking than the agricultural muriates. They are, therefore, seldom used in the liquid fertilizer field. On the subject of prices, as is well known, muriate of potash prices have been at a record low for the past two years. Although prices for the present year are firmly established, it is conceivable that prices may be increased in the fertilizer year beginning July 1, 1960.

Although the higher purity agricultural grade of muriate of potash used in liquid fertilizer manufacture constitutes an appreciable portion of the total supply of agricultural muriates, the factors which influence the anticipated total supply of all types of potash products, may exert perhaps an even greater effect on the possible supply of this type of muriate. The latter type of higher purity product also finds widespread application in other branches of the plant food and chemical industries. The lower analysis agricultural muriates, although fully suitable for many applications, are not generally used in liquid fertilizers because of the insoluble impurities which they contain.

Since the higher purity agricultural forms enjoy a wider variety of end uses, the supply and demand relationship for these products may be in even closer balance than that anticipated for all potash products.

Regardless of the anticipated supply outlook for potash, the liquid fertilizer manufacturer must have that product on hand at his plant when he needs it in his manufacturing operations. At that point it is of little value to him to know where this particular raw material may be obtained. Unfortunately, in the fertilizer industry the manufacture and movement of the major portion of a plant's annual output is crowded into a relatively short period of from two to four months.

Time lost in awaiting the arrival of raw materials in this peak season is valuable time which may never be regained. Therefore, it behooves the fertilizer manufacturer to plan and schedule properly the ordering of his raw materials in advance of his needs, making due allowances for in-transit time from the source to his plant.

In many instances, raw material storage space at the fertilizer plant is inadequate to meet even the most minor fluctuation in the manufacturing program. In such cases, serious consideration should be given to the construction of adequate storage facilities. Only in this way can the fertilizer producer provide the type of service his customers expect, while at the same time taking advantage of every opportunity for increasing his sales and profits.

Published reports of recent years have publicized the over production which existed in the potash industry. However, dynamic economic and educational forces have been and are at work fostering increased consumption of potash products in both the chemical and agricultural fields, thereby narrowing the gap which has existed between supply and demand.

IOWA REPRESENTATIVE

CHICAGO—The Prater Pulverizer Co. has appointed the Patty Mill Equipment Co. headed by Richard M. Patty, Marshalltown, Iowa, to the territory of Iowa, west of Highway 69.

Panogen Announces New Appointments

CHICAGO — Dr. Raymond Seven, formerly technical director of Panogen Co., has been appointed assistant general manager, according to Petrus Hellman, president and general manager. Panogen Co. is a division of Morton Chemical Co. with headquarters in Chicago.

Mr. Hellman also has announced the appointment of Charles Hutchinson as marketing manager for seed treatment products, and William J. Crist as marketing manager for the soil pesticides.

Report on 1959 Labor Law Presented in New Booklet

MILLINGTON, N.J.—The benefits provided for management in the new 1959 Labor Law are now in effect, reports Ola C. Cool, director of the Labor Relations Institute. Included are such new rights for management as the prohibition against "shake down" picketing, new rules restricting union picketing for recognition, bans on "hot cargo" agreements and "unloading fees," as well as new protective procedures.

These new management benefits under the 1959 labor law and the amendments to the Taft-Hartley Act, all now in effect, are fully set forth in layman's language in a new report just issued by the Institute, a national employer, membership organization.

Single copies are available for $1 from the membership service division, of the Labor Relations Institute, P.O. Box 306, Millington, N.J.

FERTILIZER PLANT OPENS

ALTA, IOWA—Wayne Page of Storm Lake, Iowa, has opened a fertilizer plant here.

Leasing Information Made Available

CHICAGO—A new edition of its study on equipment leasing for smaller manufacturers, department stores and supermarkets has just been issued, it was announced by the Foundation for Management Research.

The 20-page study is entitled: "The Pros and Cons of Equipment Leasing for Smaller Manufacturers, Department Stores, and Supermarkets."

Included in the study are data tables and charts analyzing the comparative costs of leasing, outright cash purchase, and purchase by conditional sales contract. In addition, charts analyzing cash flow are included.

Set out in detail are analyses of specific situations where it is advantageous to lease equipment and situations where it is disadvantageous.

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What's New?

Additional information is available about new products, new services, and literature described in this department. Circle the numbers of items on which you desire more information, fill in your name, your job title, your company's name and address on the card. Then clip it out of the page and mail. No postage is necessary.

No. 9147—Indicator Unit

Remote indication of both batch and cumulative weights is given in a unit introduced by Richardson Scale Co. The unit combines indicator and single unit totalizer. Totalizer records cumulative weight in pounds either of a single ingredient or, when used in a proportioning system, of a combination of ingredients. Output during any hour, shift or day may be read directly on the totalizer-counter. The indicator pointer, remote from the dial scale, follows the dial scale pointer movement. As the indicator pointer rotates, the counter is driven through an electric clutch

and suitable gearing to totalize pounds of material. When the dial scale returns to "zero" position, the pointer on the indicator also returns to the zero position, but the counter remains at the accumulated weight. The counter can have a graduated units wheel, one or more dormant zeros, or a decimal point, depending on the capacity and readability desired. The standard counter contains six digits and has a reset feature. The indicator-totalizer is available with its own dust-tight enclosure. For more information check No. 9147 on the coupon and mail.

No. 9149—Insecticide Bulletin

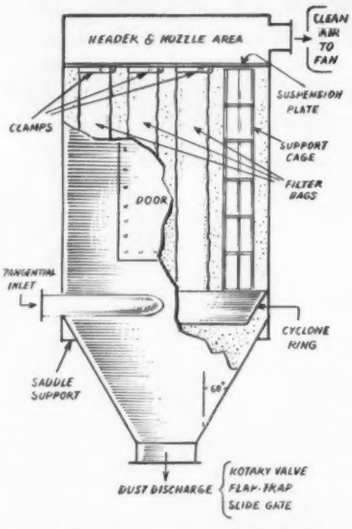
A technical bulletin describing Fairfield Residual Concentrate No. 1, a combination of pyrenone and malathion, has been prepared by Fairfield Chemicals, Food Machinery & Chemical Corp. The bulletin describes the concentrate and its properties, as well as offering a sample label. The concentrate, company literature says, is effective in controlling roaches and other crawling insects. For copies of the bulletin, check No. 9149 on the coupon and mail.

No. 9150—Coating System

Prufcoat Laboratories, Inc., announces the availability of Prufcoat Primastic, a protective coating that combines rust-inhibitive primer properties with chemical resistance from a catalyzed epoxy coating. According to company literature, the coating is said to withstand severe corrosive exposures and to make one-coat protection possible for process equipment in the chemical and other industries. The product requires only one brush or spray coat for a coating up to 10 dry mils in thickness. For more information, check No. 9150 on the coupon and mail.

No. 9151—Dust Collector

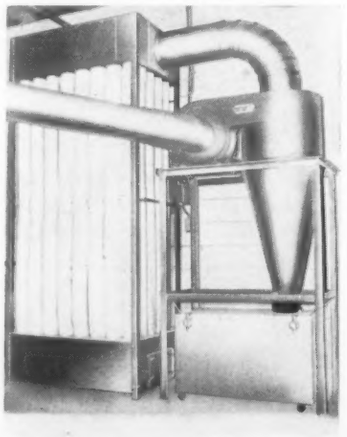
No moving parts, constant air flow and pressure drop and automatic filter tube cleaning are features of the dust collector being announced by Flex-Kleen Corp. The cylindrical collector receives dust-laden air through a tangential cyclone ring, and heavier



materials are immediately dropped, thus preventing overloading of the filter tubes. The lighter materials are collected on the outside of the filter tubes. As the accumulation builds up, these tubes are intermittently flexed taut by sharp bursts of compressed air in a continuous series of sequences. Complete details are available by checking No. 9151 on the coupon and mailing.

No. 9140—Auxiliary Filter

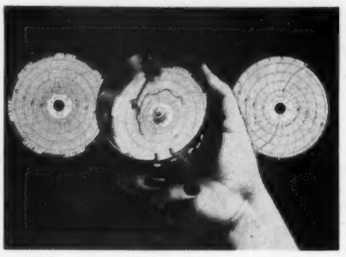
A cloth tube, auxiliary filter has been announced by the Aget Manufacturing Co. It is designed for use with 3,000 or smaller series "Dustkops." The 40 cloth tubes of the filter are made of flame resistant material and sealed top and bottom by a molded rubber grommet, which is said to



reduce wear at these contact points to a minimum and hold the tubes tightly in place, the company says. The unit, known as the F.T. 40, comes equipped with a manual shaking device so that the tubes can be freed of collected dust at regular intervals. Dust falls into a storage bin at the bottom reducing re-entrainment of dust due to air turbulence. The inlet flange at the filter top can be at sides or ends, so that the filter location is flexible. For complete details, check No. 9140 on the coupon and mail.

No. 9141—Recording Thermometer

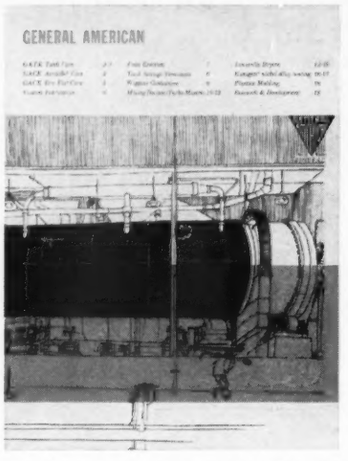
The Pacific Transducer Corp. announces a recording thermometer with dry stylus. The thermometer can be used in a number of industries,



including food, chemical agriculture, research and others. For recording temperatures of liquids or wet environments, the instrument can be encased in a polyethylene bag. The unit utilizes a dry scriber. The thermometer uses a spring wound clock movement and is made in two different time ranges, either 20° F. to 220° F., or minus 40° F. to 160° F. For details, check No. 9141 on the coupon and mail.

No. 9148—Products Catalog

A 20-page, illustrated catalog, containing information, photos and descriptions of services and products for the process industries has been released by General American Trans-



portation Corp. The publication, in color, contains tables, schematic drawings and specifications about a great many of the company's offerings. Copies of the catalog can be obtained by checking No. 9148 on the coupon and mailing.

No. 9142—Ammonia Hose

Two constructions of agricultural ammonia transport hose are available from Raybestos-Manhattan, Inc., both designed to withstand working pressures to 300 psi and to meet state

safety regulations for the use of anhydrous ammonia. The company also offers an ammonia applicator hose. Paranite BW ammonia hose is heavy duty, braided wire construction for loading storage tanks, trucks and tractors. A corrosive resistant steel wire braid and a strong cord braid

Turn to WHAT'S NEW, page 26

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WHAT'S NEW

Continued from page 24

are applied at controlled angles to withstand high pressure and to minimize elongation and contraction due to changes in pressure. The hose is available in sizes ⅜ in. to 2 in. and in 50 ft. lengths. Homoflex ammonia hose is a braided ply construction for filling tractors and for feed lines. Available in sizes ¼ in. to 2 in., and in 50 ft. lengths. Check No. 9142 and mail for details.

No. 9143—Reducer Catalog

Information on a line of helical gear speed reducers is contained in Book 2751 released by Link-Belt Co. The 20 page book consolidates descriptions of the company's in-line helical gear speed reducers in one

catalog. The publication contains tables of load classes and service factors, plus selection information on motor couplings and geared flexible couplings designed for use on the reducers. Also contained are horsepower and torque ratings, dimensions, overhung load for high and low speed shafts and mounting arrangements. For copies, check No. 9143 on the coupon and mail.

No. 9145—Liquid Fertilizer Booklet

A non-technical booklet giving in some detail a businessman's view in the production of liquid fertilizer solutions has been released by the chemical plants division of Barnard & Leas Manufacturing Co., Inc. The folder gives a summary of the trend, the opportunities today and a general picture of its operation. The chemical formulas have been removed, company literature says, and a pictogram of the process involved with an idea of a plant operation substituted. Complete information and a copy of

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the booklet is available by checking No. 9145 on the coupon and mailing.

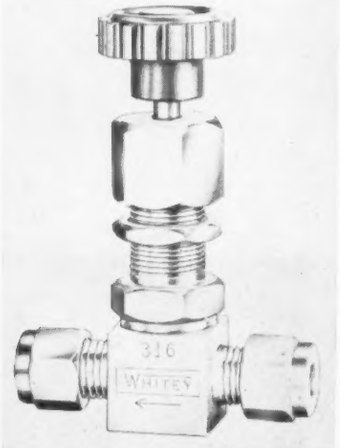
No. 9146—Emergency Suit

Union Industrial Equipment Corp. announces the Unico Model No. 75/20 vapor-proof emergency suit designed and developed for use where acid and vapor protection is required. It can be used with any type of self-contained breathing apparatus. The suit

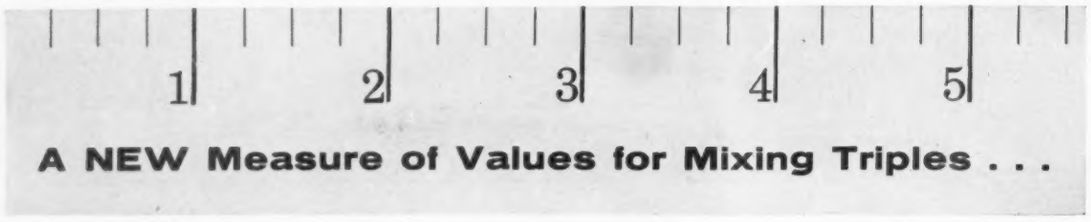
is constructed with full cemented seams, gum strapped on the outside, and completely vulcanized after assembly. Opening and closing are accomplished with a self-sealing slide fastener extending from the left knee, over the left shoulder and around the head. More details and information is available by checking No. 9146 on the coupon and mailing.

No. 9144—Control Valves

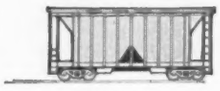
Availability of Whitey Micro Regulating Needle and Fingertip Control Valves in sizes from ⅛ in. to ½ in. has been announced by Whitey Research Tool Co. The valves, furnished in stainless steel, Monel and Hastelloy, can be adapted to most specifi-



cations of research, the company says. They are recommended for applications the processing of viscous and volatile liquids, and for gasses at high and low temperature, pressure vacuum and corrosion conditions. For details, check No. 9144 on the coupon and mail.



A TEST CARLOAD



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Wet Phosphoric Acid in Making Liquid Fertilizers

By F. M. Batson*
General Chemical Division
Allied Chemical Corporation

PHOSPHORIC ACID is a chemical obviously of great importance to the fertilizer industry. There are two basic methods of manufacturing phosphoric acid. One is the electric furnace process in which phosphate rock is converted to elemental phosphorus, and which is then burned to phosphorus pentoxide, and finally hydrated to phosphoric acid. The other is the wet process in which the rock is reacted with sulfuric acid to yield phosphoric acid, and a by-product calcium sulfate. This paper will discuss wet-process or "green" acid.

The fertilizer industry manufactures a great deal of phosphoric acid by the wet process, and uses it to make triple superphosphate. This acid, which contains organic matter and other materials extracted from the phosphate rock, may be dark green, or almost black, in color, which has led to it being called "green" acid. Such acid is quite suitable for the purpose for which it was intended, making triple superphosphate. For most other purposes, however, wet-process acid must be purified.

In the last few years the solutions industry has developed this new and increasingly popular method of feeding plant life. One of the major concerns has been to find adequate, economical, and timely supplies of raw materials. As recently as 1956, one of the trade journals, in reporting on the need for cheaper raw materials, stated:

"Wet-process phosphoric acid cannot be used for making neutral solutions because it causes precipitation. Since it is both cheaper and more plentiful than the electric-furnace product used today, development of ways to use it would give the liquid mixes an important economic boost."

It is easy to understand that wet-process acid that was entirely satisfactory for triple super production might not be satisfactory for liquid use in its "as is" form. When the acid manufacturers became aware of the extent of the solutions industry's tonnage requirements for acid, and of the quality needs, General Chemical Division, as well as the other wet-process acid producers, endeavored to meet those demands. We now find in recent trade journals articles on the successful use of wet-process acid for making liquid fertilizers.

There are manufacturers who produce purified wet-process acids for uses other than superphosphate. If I may be permitted, I will talk about General Chemical's product, since that is the one with which I am most familiar. I am reasonably certain, however, that the statements I may make will apply equally as well to other purified wet-process acids.

General Chemical does not manufacture triple superphosphate and has no interest in it. We do, however, produce our own wet-process acid for use in the manufacture of sodium phosphates of various types. The acid is made by a process which eliminates the organic and certain other impurities to permit its use in our chemical processes. By concentration, this same acid is made available to liquid fertilizer makers as green acid of 75% strength. Several years of experience by liquid fertilizer producers on the East Coast, and a somewhat shorter, but equally significant, period of experience on the part of Midwest producers, have shown that this green acid can be used successfully.

By observing normal mixing techniques, and by making only slight changes in the ordinary handling procedures of the neutralized mixes, green acid is now used successfully in all liquid fertilizer formulations.

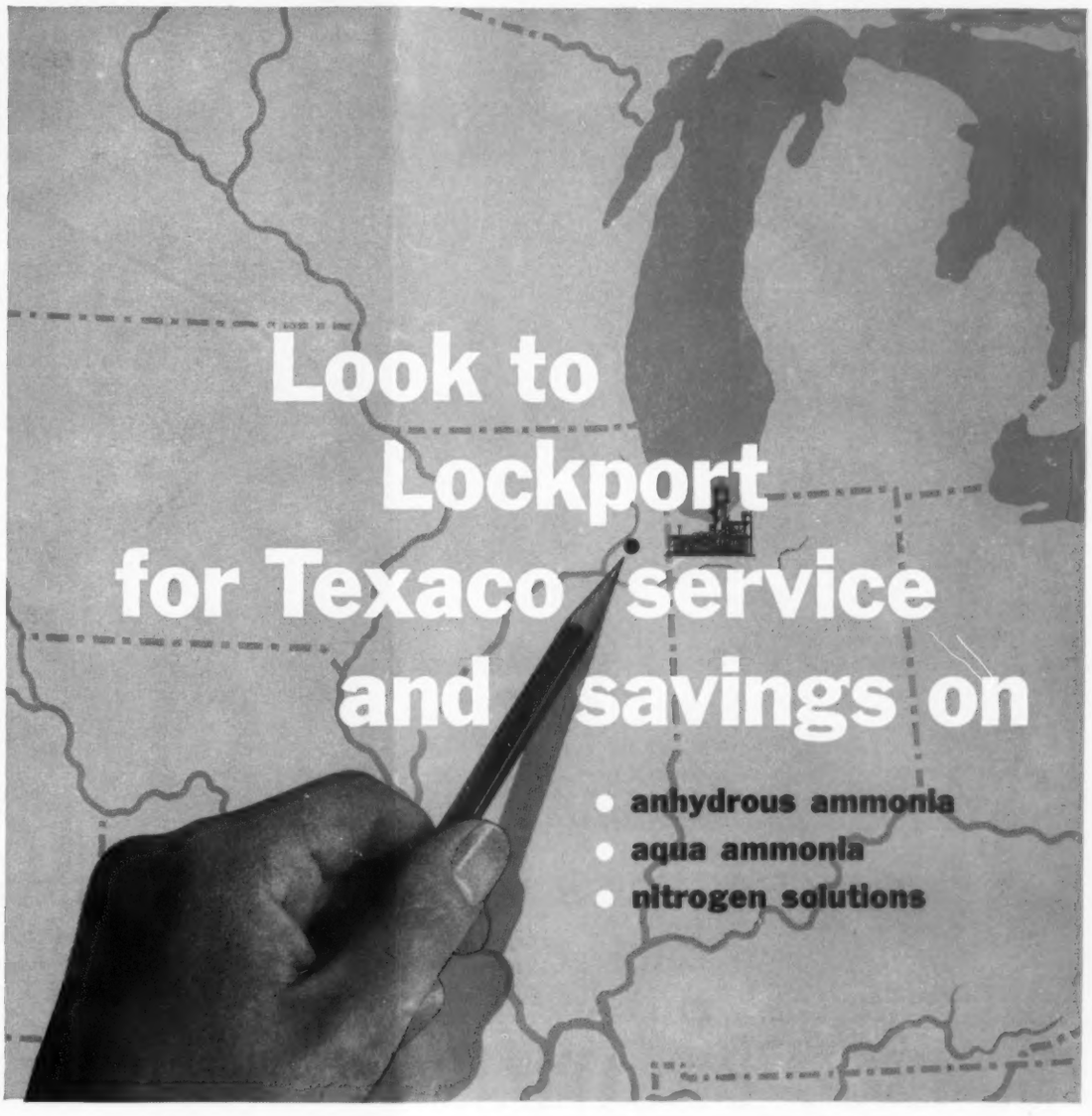
The article quoted earlier referred to a precipitation which results when green acid is neutralized with ammonia in the production of liquid fertilizers. Actually, the milky substance which forms does not introduce any serious handling problem. The milky appearance is due to the presence of very light particles, microscopic in size, consisting mainly of iron and aluminum phosphates.

The fertilizer is put on the fields in the normal fashion, using the regular spray nozzles. The orifices are not clogged by solutions made from purified wet-process acid. On standing, the cloudy material will gradually settle, but is easily resuspended by air agitation, or by recirculation. A case in point, illustrating this, one Eastern producer held a completed fertilizer solution in his storage tank over the winter. He applied it to the fields the next spring, after a brief recirculation through his pump. He had no trouble.

As for the milky color itself, there are those who feel that the appearance of such solutions has a decided sales advantage. I recall in the early days of liquid fertilizers, on the East Coast, one manufacturer said to me, "I couldn't sell milky white fertilizer solution — the farmers are used to seeing it water white." This manufacturer is currently using wet-process acid. More recently another producer said "our farmers prefer the milky color—they can see what they

Turn to PHOSPHORIC page 30

*From paper presented at National Fertilizer Solutions Assn. Convention, St. Louis, Mo., Nov. 10, 1959.



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Bagpak Division **INTERNATIONAL PAPER** New York 17, N.Y.

ROUND TABLE

Continued from page 11

forced cooling air was semi-granulating a 12-12-12, with the product leaving the mixer at 200 to 210° F. and leaving the dryer-cooler at 115° F. and 2.5% moisture, both being about the maximum for lengthy storage. About the same temperature and moisture relations existed in another plant producing an 8-16-16, which obtained its cooling merely by rehandling, there being no cooler or dryer.

Economic considerations in any system justify crowding it to the maximum of its several features; moisture and temperature in storage are the first to suffer, unless getting granulation at all is the major problem in overcrowding.

Urea-Ammonium Nitrate Solutions Discussed

Comments on urea-ammonium nitrate solutions in conventional fertilizers were presented at the Round Table by H. H. Tucker, Sohio Chemical Co., Lima, Ohio. He said that the use of four-component, ammonia-ammonium nitrate-urea-water solutions has increased rapidly within the past few years and now makes up a sizeable portion of all ammoniating solutions used in fertilizer manufacturing.

Here are some of the reasons given by Mr. Tucker for their acceptance and use of urea in ammonia-ammonium nitrate solutions:

1. Lowers saturation temperature, salt out temperature and the vapor pressure of the solution.

2. Makes possible the transportation, storage and use of higher fixed to free ratio nitrogen solutions—solutions with a higher ratio of salts to ammonia.

3. Increases the amount of nitrogen which can be obtained from solutions.

4. Reduces the amount of acid required to neutralize excess free ammonia and consequently prevents excessive heat.

5. Increases the volume of the solution phase and therefore the agglomeration of fertilizers.

6. Alters the crystal structure of ammonium chloride.

7. Softens the end product or decreases the hardness of bin or bag set.

How much urea is required to bring about a change in crystal structure that would reduce the knitting together of fertilizer particles, particularly in non-granular types?

Research has indicated that at least 20 lb. urea to the ton of end product is required to permeate the mixture thoroughly and accomplish the desired result. Larger amounts may be used, but other factors may set an upper limit on the amount of urea to use.

It is possible to overdo softening of the end product. The softening effect is at least partially brought about by the increase in the solution phase due to mutual solubility effect of urea and other fertilizer salts.

When then is the upper limit on the amount of urea which can be used with ammonium nitrate? This will depend on a number of factors including grade of fertilizer, moisture content, type and length of storage and atmospheric conditions particularly temperature and humidity. A general rule of thumb is that 50 lb. urea to the ton of end product is the upper limit when used in conjunction with ammonium nitrate.

The amount of solution to be used should then supply between 20 to 50 lb. urea. An even narrower range of 30-40 lb. may be preferable. The common four component ammoniating solutions contain from 6 to 15% urea with 68 to 40% ammonium nitrate and also have a rather wide range of ammonia to salts. This permits the selection of a solution to fit specific requirements of fertilizer grade and desired formulation.

Agrico Plant Opens at New Wisconsin Location

JOHNSON CREEK, WIS.—Fertilizer started moving from Agrico's newest plant at Johnson Creek, Wis., Nov. 13, according to J. W. Engle, regional manager for The American Agricultural Chemical Co. The plant includes facilities to store and handle Agrico's complete line of farm fertilizers and turf and garden plant foods.

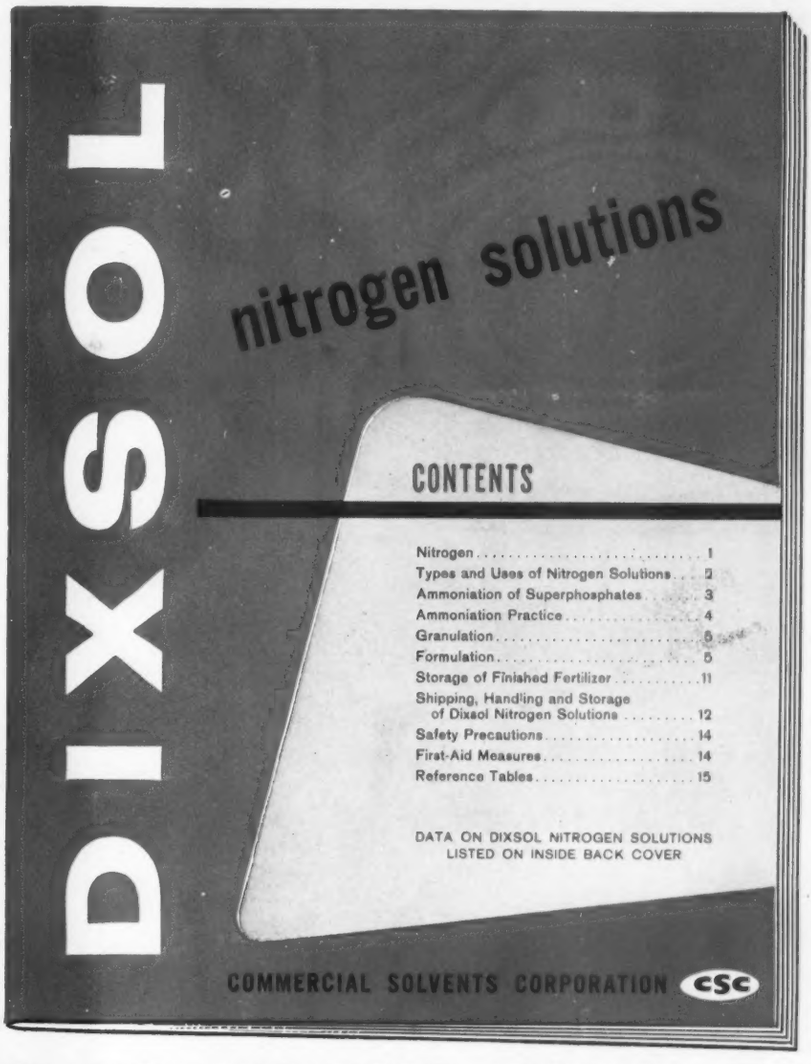
"The increasing demand for high quality fertilizers in Wisconsin prompted Agrico's decision to build manufacturing facilities in the state, to serve local needs," Mr. Engle said.

The plant is located at the junction of State Highways 26 and 30, midway between Madison and Milwaukee. Its location was chosen to take advantage of the state's network of highways, and of truckers' back-hauls from Milwaukee and Chicago.

Agrico fertilizers are manufactured by The American Agricultural Chemical Company at 39 plant locations east of the Missouri River and in Kansas. In addition to manufacturing their complete line of farm fertilizers and turf and garden plant foods, the company produces a broad line of industrial chemicals, and is a basic producer of phosphate rock and phosphate products.

RAYMOND C. ELLIS DIES

NEW ALBANY, IND. — Raymond C. Ellis, for 45 years manager of Hopkins Fertilizer Co. at New Albany and later president of the Ellis Chemical Co., died Nov. 11 after a long illness.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PHOSPHORIC

Continued from page 27

are getting." I mention these instances simply to illustrate that the color factor is what the manufacturer makes it. The crops can't tell the difference.

While considering this matter of precipitation it should be pointed out that TVA has done, and is continuing to do, considerable work on the use of superphosphoric acid as a sequestering agent to prevent precipitate formation. A number of manufacturers have experimented with this acid.

Another point that may be of interest is what some liquid manufacturers have referred to as "trace elements." You will recall that I pointed out that wet-process acid contains various materials that are extracted from the phosphate rock. These include iron, aluminum, and a number of the other elements such as manganese, boron, copper and magnesium. One particular liquid manufacturer was very anxious to have a complete analysis of the acid listing all these elements so as to be able to prove that his product was not lacking in the trace materials normally found in dry fertilizers. These small amounts of materials are present, and may be useful, although they do not provide a total correction for all deficient soils.

The matter of sediment in green acid is still another area that may be of interest. As I mentioned earlier, a byproduct of wet-process acid manufacture is calcium sulfate. Phosphoric acid seems to have an infinite capacity for remaining very much supersaturated with calcium sulfate. This material has the characteristic of almost endlessly dropping out of solution.

In the early days there were some problems with the calcium sulfate settling out in tank cars and storage tanks. Ways have now been found to prevent this settling out. In fact, our specifications permit far less than one-half per cent of such material at time of shipment.

Now what about the availability, or supply, of purified green acid? Because of the demand for this product, for economic and quality reasons, we have had to face a good many problems which are inherent in your industry as well as ours, and which must be successfully met if the supply of acid is to meet the demand.

A brief consideration of chemical economics will indicate that it would not be practical to run an expensive manufacturing unit several months a year, and let it sit idle for the balance of the year. This would entail astronomical costs. The obvious answer, of course, is to run the plant all the time. This immediately raises the question as to what to do with the acid steadily streaming out of acid plants during the months when you folks do not need it.

We should therefore consider storages for phosphoric acid. Right today, while we are expanding our production facilities, we are also installing additional substantial storages. We believe, however, that it would be impractical for any acid manufacturer to put in enough storage to hold his entire production in the off months, so that it would be available when needed in the spring and fall. Even if all the acid were stored, the matter of having enough tank cars or tank trucks to deliver the acid during the period of high demand would present another major problem.

The obvious method of alleviating the acid supply situation is for the people involved to work out operations so that we can produce and deliver acid throughout the year. We fully appreciate the position of the distributor when the farmers are calling for fertilizer, and there is an acid shortage. We have found ourselves in this same unfortunate position when you needed acid and we could not provide it.

Accordingly, we think that each manufacturer interested in preserving, or acquiring, an assured supply position should put in sufficient storage so that he can receive acid on a regular monthly basis throughout the year.

This suggestion may seem to pose a financial problem, even though justified by supply requirements which may not have always been met satisfactorily in the past. The financial aspects in connection with acid storage have also been of concern to us.

We, therefore, made storage facilities the subject of a very considerable investigation by our corrosion laboratory and construction engineers, working as a team. A practical approach and inexpensive in nature is at hand. We have developed materials of construction, and methods of using them, which we believe will enable storage of purified wet-process acid without chemical deterioration for an indefinite period of time.

Cost of such a storage facility is relatively low; a facility of perhaps 400 tons being constructed for roughly $5,000 or less. The ground is hollowed out by a bulldozer, with soil removed being used to build up the sides. After the basin is prepared, the bottom and sides are coated with a membrane of multi-layered burlap and asphalt. The storage basin is covered with a roof to keep out rain, and foreign matter.

So here is a picture of wet-process, or green acid. It is being widely and successfully used. I have discussed major problems with regard to acid and have suggested what appears to be a practical answer to them.

In conclusion, I believe it is safe to say that green acid will play an increasingly important part in the exciting new field of liquid fertilizers.

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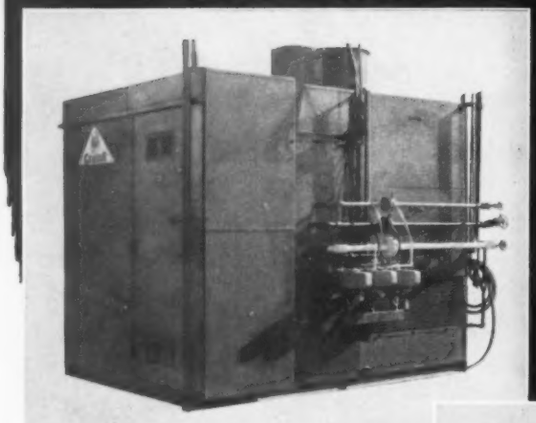

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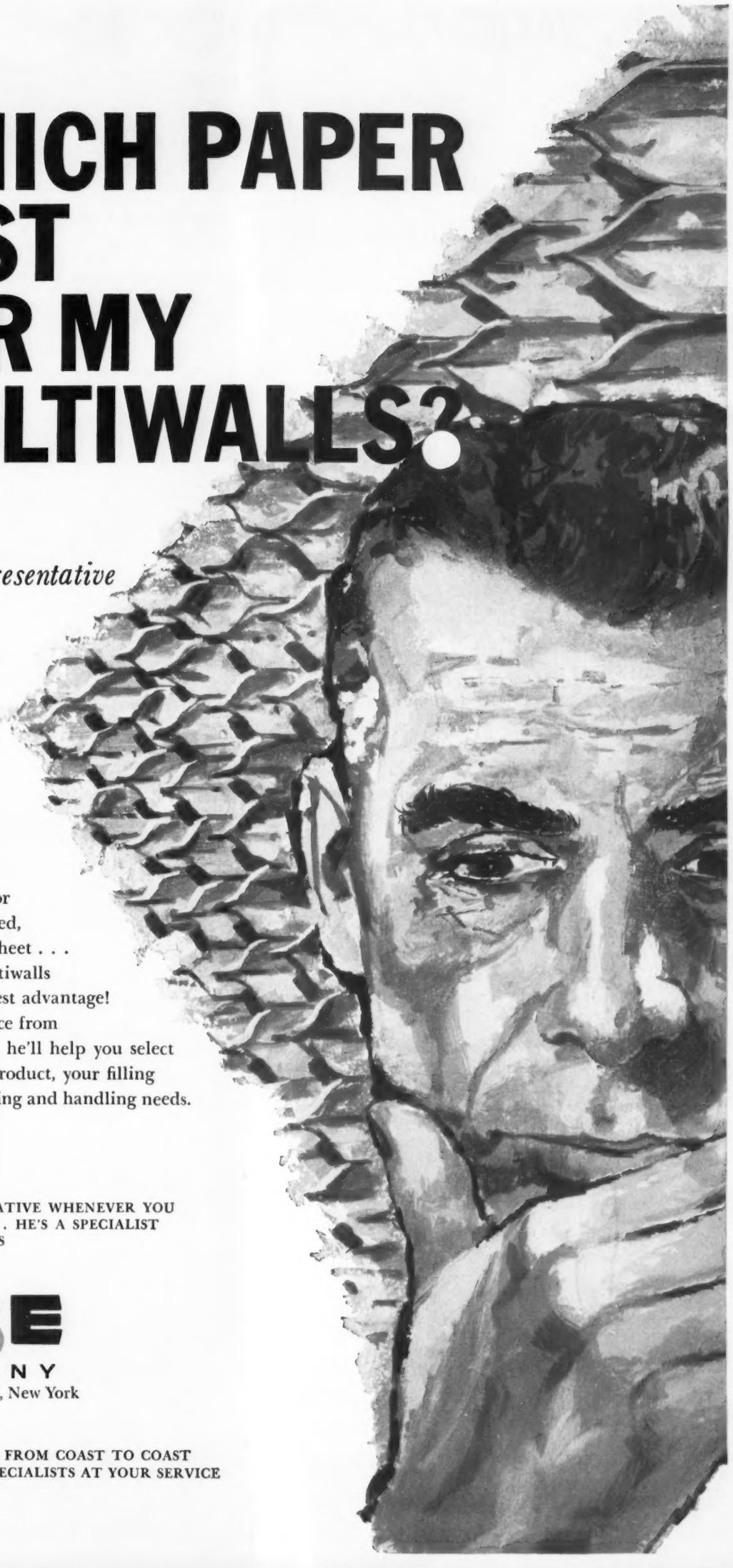
MOVES OFFICE

SAN MARINO, CAL.—The Chilean Nitrate Sales Co. has recently moved its west coast offices from 412 West Sixth St., Los Angeles, to 475 Huntington Dr., San Marino. Earle J. Shaw is district manager. The company now occupies a portion of the offices vacated in June by the California Fertilizer Assn., which moved at the time to Sacramento.

WHICH PAPER IS BEST FOR MY MULTIWALLS?



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Continued from page 5

have added material handling equipment and increased the ease of handling everything. We have put in front end loader tractors, and conveyor systems.

"It all adds up. Since these improvements were installed, we have been able to hire a better grade of workman, most of whom we keep on a year-around basis. They do better work, pay more attention to safety rules and, in short, do a better all-around job."

Mr. Bondurant gave some examples of how things have improved over the years. "Every summer we have an all-employee picnic at Riverview Park in Des Moines, and the men bring their families along for an outing. There are games for both the men and women; contests for kids and oldsters, horseshoe pitching, bingo games, races. Everyone has a good time. The kids have free tickets to the park's amusement rides and the employees and their families have learned to look forward to this event.

"In the winter, it's the Christmas party. A big affair. The 25 men in the plant bring their families to this party, too, and there are presents for all. Last year there were about 160 on hand. They sing carols and have a wonderful time.

"At this Christmas party we present the safety awards for the year. It impresses the whole family and makes the men more conscious of safety both at home and at the plant."

The safety organization at the Iowa plant is built around a committee composed of one man from each section (maintenance, shipping and granulation) and three company members. The group meets once a month, the plant is inspected by teams, and reports are made to management of any unsafe conditions around the building.

Members of the committee rotate over the period of a year so everyone will eventually have the opportunity to serve. Once each season, the entire plant roster meets to discuss safety topics.

Some of the obvious evidences of safety-mindedness noted by a visitor are safety helmets on the head of each person in the plant; locks on electrical switches to prevent accidental start-up; and the general "hustle" throughout the plant. "The men take pride in their work," Mr. Bondurant says. "It is very seldom that any man is late for work, and they are eager to do a good job all the time. Some of our employees have been with us for 8 years or more, and that speaks well for the situation."

A final touch is the landscaping of the grounds on which the plant is situated. The grounds are kept up in good shape during the summer months, with flowers and green grass. Thousands of flowers are planted and staggered timewise so some are in bloom at all times during the warm months.

"All this helps morale and maintains good relations with our neighbors," Mr. Bondurant added.

Joins Sales Staff of Chippewa Plastics Co.

CHIPPEWA FALLS, WIS.—George N. Keyser, sales manager for Arkell Safety Bag Co. of Chicago, has joined the sales staff of Chippewa Plastics Co., a division of Rexall Drug and Chemical Co. as product sales manager for industrial products, George Dingman, general manager of the Chippewa Falls firm announced.

George N. Keyser

In his new position, Mr. Keyser will be concerned with developing new applications for the heavy-duty polyethylene industrial bag made by Chippewa Plastics. This bag is already being used for bulk packaging of such products as ammonium nitrate and polyethylene resin.

Mr. Keyser, who held various sales positions during his 24 years with the Arkell organization, has been involved in many of the advances in packaging techniques developed in recent years.

V. I. McCarthy, Sr.

V. I. McCarthy, Jr.

Vulcan Containers Names New Head of Firm

BELLWOOD, ILL.—Vern I. McCarthy, Jr., 32, has been named president and director of marketing of Vulcan Containers Inc., maker of steel shipping containers, it was announced Nov. 16 by Vern I. McCarthy, Sr., who moves up from the presidency to chairman of the board.

Mr. McCarthy, Jr., is the third generation of the McCarthy family to serve the company as president. The senior McCarthy will continue to play an active role in long range planning and research, the announcement said.

With the company in an executive capacity since 1953, the new president has served in a number of other posts for more than 15 years. Prior to this appointment, he was vice president—marketing and director of sales.

The 43-year-old corporation manufactures a wide range of steel shipping pails, drums and tinplate cans ranging in size from one ounce to 55 gallons.

NAMED SHIFT FOREMAN

PARKERSBURG, OHIO — Robert W. Kirkbride has been appointed shift foreman in the Willow Island plant of American Cyanamid Co., according to A. C. Fennimore, plant manager.

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Mr. Ziegler | Mr. Foster | Mr. Brooks | Mr. Chandler

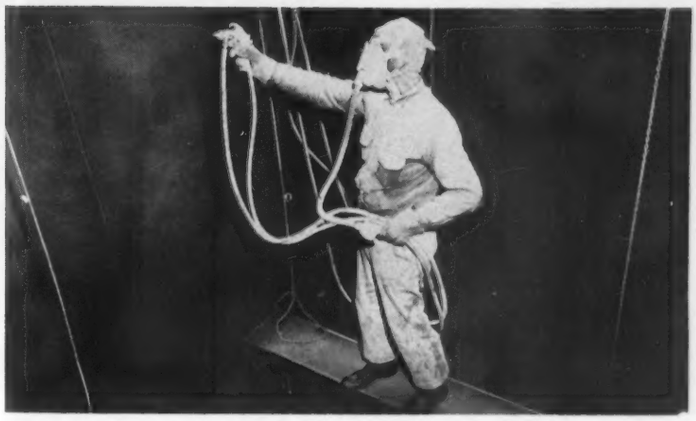
Armour Makes Changes in Plant Personnel

ATLANTA, GA.—W. J. Foster has been appointed manager of the Columbia, S.C. division of Armour Agricultural Chemical Co., according to an announcement by H. Vise Miller, vice president and general manager of the Armour Fertilizer Division.

Mr. Foster replaces Paul J. Ziegler, who is retiring after 34 years of service as salesman and manager of the Armour Columbia division, Mr. Miller explained.

In other personnel changes, Mr. Miller announces the transfer of A. W. Chandler from his position as manager of the Armour San Juan, Puerto Rico division, to sales manager of the Greensboro, N.C. division, under H. H. Kemp, division manager. Mr. Chandler will be succeeded in the San Juan division by Charles M. Brooks.

The changes were effective immediately, Mr. Miller stated.



ANTI-CORROSION COATING—Thiokol Chemical Corp., Trenton, N.J., has developed a polysulfide liquid polymer and epoxy resin for coating rail hopper cars to protect against corrosion and abrasive action of fertilizers and other bulk chemicals being transported. The protective coating is sprayed on the interior and exterior of the railroad car.

New Research Center Planned by Stauffer

NEW YORK — Stauffer Chemical Co. has completed plans to build a major research center at Richmond, Cal. It will be located on a 10-acre tract recently acquired by the company adjacent to the present Richmond plant and research laboratories.

Construction of the first unit of the new research center will begin in January. Completion of this initial laboratory, which will cost about $1.6 million, is scheduled for early 1961.

The existing research facilities at Richmond will be used to expand process development and pilot plant activities.

The central building will be of a wing-type design to facilitate future expansion and integration with other planned facilities. It will be of reinforced concrete construction and will utilize aluminum, porcelain and glass extensively as functional and design elements. It will include, initially, administrative offices, twenty laboratories for basic and applications research, library, and auditorium, units for bench-scale process development and the usual service facilities.

Stauffer also operates research laboratories at Los Altos, California, Chauncey, N.Y., Weston, Michigan and Houston, Texas.

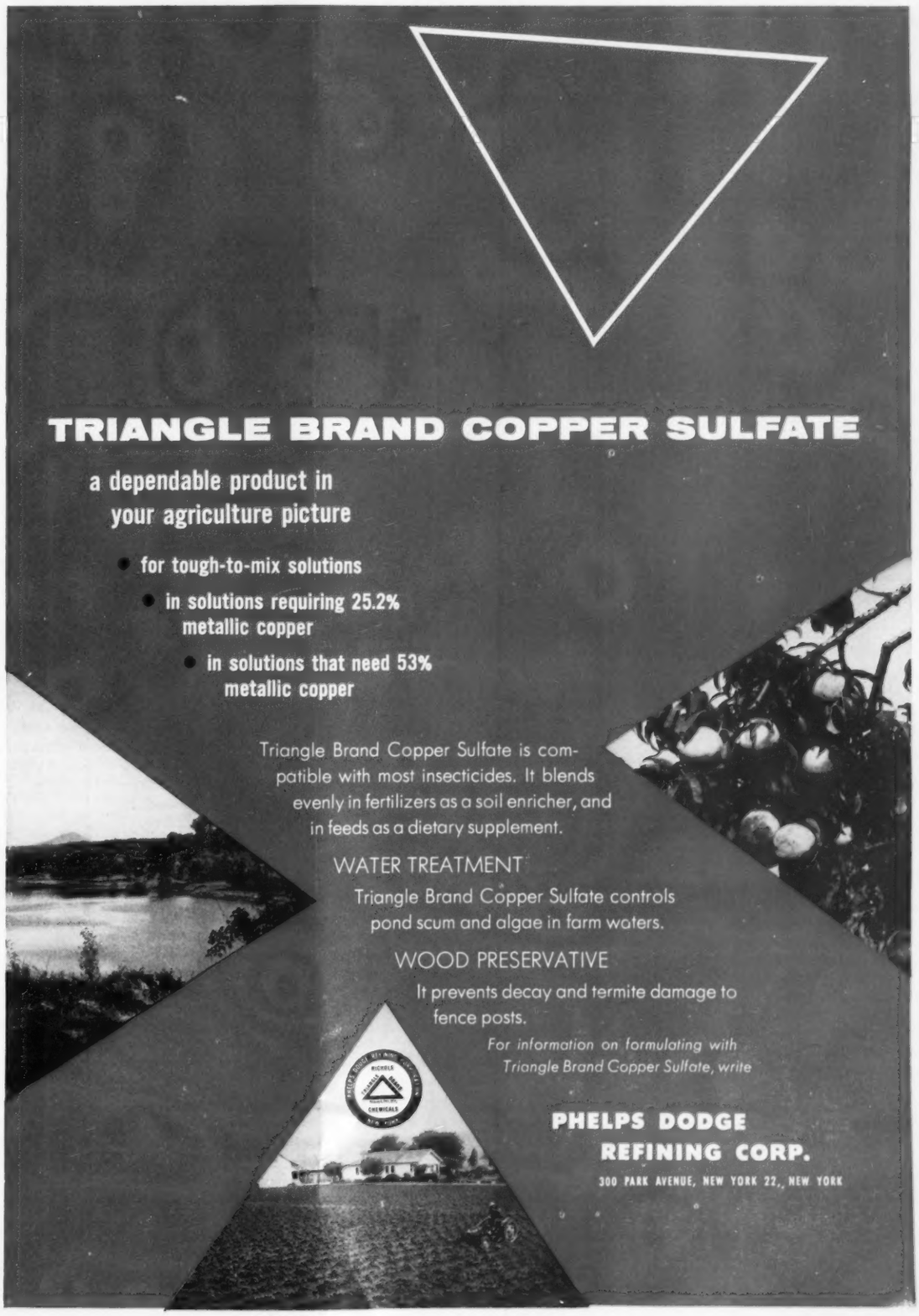
Two Construction Firms Announce Their Merger

CINCINNATI, OHIO — Chemical and Industrial Corp. of Cincinnati and Girdler Construction Co., Louisville, Ky., a division of Chemetron Corp., have jointly announced that they will combine their activities and facilities.

Chemical and Industrial Corp. will be the parent company and Girdler Construction the subsidiary, the announcement said. Both are engaged in the design, engineering and construction of processing plants for the chemical, petroleum, natural gas and other industries.

Charles J. Haines, president of Chemetron Corporation, said in Chicago that the combination of the resources of Chemical and Industrial in which Chemetron will have a substantial minority interest with those of Girdler Construction should result in an enlarged scope of activity.

H. H. Hamilton will continue as chief executive officer of the parent company and W. Roberts Wood will continue as head of Girdler Construction.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Editorial

Improvement Seen in Accident Record, But 'There Is Still Much Land to Be Possessed'

By Elmer C. Perrine
Nitrogen Division, Allied Chemical Corp.
Chairman, Fertilizer Section, National Safety Council

FORTY THOUSAND human sacrifices annually forty-five years ago, and only thirteen thousand this year.

Is this the report of some primitive tribe attempting to reform itself? No, it is the story of safety progress by American industry. Thirteen thousand deaths a year is still an awesome toll.

There is every indication that 1960 will see the start of a decade during which as much progress will be realized in many fields of endeavor as has been made in many decades of the past. The above figures on fatal accidents indicate that American industry has much more than matched the tremendous increase in gross national product with increased safety in machines, processes, and in supervision.

The demands for safety, like the other demands on the energies of men, will be greatly intensified in the dynamic decade that has already made its tempo apparent. Safety can best keep up with an industry if it is given an important place in the thinking, designing, and operations of new techniques. Industry has shown many times that safety can be the pleasant result of forward thinking and preventive action, just as effectively as through the grim lessons that are still far too common.

The safety record of the fertilizer industry is still quite unimpressive among the major industries of the United States but, at the same time, it has made some good progress during the past recent years toward making substantial reductions in its accident frequency.

This is of particular importance both now and in the future, since introductions of new processes and machines and complex equipment to the fertilizer industry have brought with them the necessity of eliminating so far as possible, all possibility of accidents. Under the conditions of modern plant technology, failures of men or methods can have consequences in severity and extent far beyond the imagination of the average plant operator of a decade ago.

Accidents in those days were usually direct, sudden and obvious, caused mostly by pick or shovel or through strained muscles. Safety then should have been a simple problem, compared to the complexities of today's chemical and mechanical hazards in the plant.

Most of the newer developments have brought with them problems causing deep concern to leaders in the industry whose responsibility it is to maintain safety on an industry-wide basis.

Yet, most of these problems have been overcome. It is a privilege to be associated with a trade that has taken so many troublesome hurdles in stride, as has the fertilizer industry. It is true that the industry has grown greatly in past years, but we should not lose sight of the fact that many men within the industry have grown right along with it. We can look with equal pride on the growth of both the companies in the trade and the men involved.

Anyone who has been honored by his fellow men by being elected chairman of any of the sections of the National Safety Council, could write at length on this subject, and with deep feelings. We have seen much that is good over the years, and also much that is bad.

In safety we have the unique situation of being generally unable to prove that our efforts did, in fact, prevent an accident. Only the failures can be proven; with stark reality. Since much of modern life is lived through the law of averages, we do have the tremendous satisfaction of believing that after years of intense effort from many angles, certainly some one is going happily about his daily affairs, albeit, unaware that he does so because some one, unknown to him, did care, when and where it counted most.

Lest we become complacent in our feeling of advancement, let us remember with deep humility, the fact that despite the best efforts of industry, some thirteen thousand lives were lost last year. In addition, there was other "untolled" misery resulting from accidents large and small, that went with last year's industrial progress.

And so I say, "There is yet much land to be possessed."

Pesticide Makers Involved In Cranberry Fiasco

THE CHEMICAL PROCESSING industry has a considerable stake in the outcome of the current cranberry hassle, since there is now placed in the public mind a big question about the safety of pesticides on food crops. Although the whole trouble stemmed from flagrant misuse of amino triazole, still the bugbear of "poisonous residue" causes great excitement among many people, and the clamor is on to get more legislation to regulate the manufacturers of such materials.

It was clear right from the outset when Arthur S. Flemming, secretary of Health, Education and Welfare, announced in a press conference that the cranberry crop had been contaminated, that the whole thing was calculated to cause great public agitation and that the foes of pesticides would seize the opportunity to further condemn weed killers in general. The fact that a press conference was called to give the announcement a flamboyant start is a tipoff of the grandstand aspects of the whole situation.

Not only the manufacturers of herbicides, but of all other pesticides, will feel reverberations of this matter for a long time.

There's really not much justice in it. When a careless driver runs his auto into a tree or destroys life and property through not following "directions" for safe use of his car, no one considers making it tougher on the manufacturer. Likewise, there should be no stigma on makers of pesticides when the user is guilty of "reckless spraying."

Croplife's Home Office

Croplife®
PRODUCTION EDITION

BPA — *Member of Business Publications Audit*
NBP — *Member of National Business Publications*

CROPLIFE is a controlled circulation journal published weekly. Weekly distribution of each issue is made to the fertilizer manufacturers, pesticide formulators and basic chemical manufacturers. In addition, the dealer-distributor-farm adviser segment of the agricultural chemical industry is covered on a regional (crop area) basis with a mailing schedule which covers consecutively, one each week, three geographic regions (South, Midwest and West) of the U.S. On the fourth week, production personnel in fertilizer manufacturing and pesticide formulating plants throughout the U.S. are covered in depth. To those not eligible for this controlled distribution, Croplife's subscription rate is $5 for one year ($8 a year outside the U.S.). Single copy price 25¢.

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Industry Meetings

Nov. 30-Dec. 4—27th Exposition of Chemical Industries, New York Coliseum, New York.

Dec. 1-2—Illinois anhydrous ammonia Assn. meeting, Law Hall, University of Illinois, Urbana.

Dec. 1-2—Annual meeting, Carolinas-Virginia Pesticide Formulators Assn., Carolina Hotel, Pinehurst, N.C.

Dec. 2-3—Missouri State Fertilizer Conference, Columbia, Mo.

Dec. 2-3—Indiana Fertilizer Conference, Memorial Center, Purdue University, Lafayette, Ind.

Dec. 7—Annual Kansas Fertilizer Conference, Manhattan, Kan.

Dec. 7-10—Western Canadian and North Central Weed Control Conferences, Royal Alexandra Hotel, Winnipeg, Man., Canada.

Dec. 7-10—Central Canada and North Central Weed Control Conferences, Royal Alexandra Hotel, Winnipeg, Manitoba, Canada.

Dec. 7-11—Nebraska Fertilizer Institute anhydrous ammonia workshops, Dec. 7, Lincoln, Neb.; Dec. 8, Hastings, Neb.; Dec. 9, Ogallala, Neb.; Dec. 10, Kearney, Neb.; Dec. 11, Columbus, Neb., Agricultural Ammonia Institute cooperating.

Dec. 8—Minnesota Fertilizer Industry Assn. meeting, University of Minnesota Institute of Agriculture, St. Paul.

Dec. 10-11—Michigan State University Fertilizer Conference, Kellogg Center, East Lansing, Mich.

Dec. 10-11—Arkansas Plant Food Conference, Lafayette Hotel, Little Rock, Ark.

1960

Jan. 5-6—Annual Texas Fertilizer Conference, College Station, Texas.

Jan. 6-7—Wisconsin Pesticide Conference with Industry, Wisconsin Center Bldg., University of Wisconsin, Madison.

Jan. 6-8—14th annual meeting, Northeastern Weed Control Conference, Hotel New Yorker, New York City.

Jan. 7-8—Colorado Fertilizer Conference, Ft. Collins, Col.

Jan. 12-13—Nebraska Fertilizer Institute annual convention, Pershing Auditorium, Lincoln, Neb.

Jan. 12-13—Thirteenth Annual Meeting of the Ohio Pesticide Institute, Lincoln Lodge, Columbus, Ohio.

Jan. 13—New Mexico Agricultural Chemical Conference, third annual meeting, Milton Hall, New Mexico State University, University Park, N.M., Dr. J. Gordon Watts, chairman.

Jan. 13-14—Pesticide School, North Carolina State College, Raleigh, N.C.

Jan. 13-15—Ninth annual convention, Agricultural Ammonia Institute, Statler Hilton Hotel, Dallas, Texas.

Jan. 20-21—Third Annual Arizona Fertilizer Conference, University of Arizona campus, Tucson, Ariz.

Jan. 20-21—Northwest Agricultural Chemical Industry Conference, Benson Hotel, Portland, Ore. C. O. Barnard, executive secretary.

Jan. 20-22—Thirteenth annual Southern Weed Conference, Buena Vista Hotel, Biloxi, Miss.

Jan. 25-26—Second annual Agricultural Pesticide Conference, Purdue University, Lafayette, Ind.

Jan. 28-29—Annual meeting of the Colorado Agricultural Chemicals Assn., Cosmopolitan Hotel, Denver, Colo.

Feb. 9-11—Seventh annual Agricultural Chemicals Conference, Texas Technological College, Lubbock, Texas.

Feb. 11-12—Midwest Agronomists-Fertilizer Industry meeting, Edgewater Beach Hotel, Chicago, Ill.

Feb. 12—California Ammonia Meeting, Hacienda Hotel, Fresno, Cal.

Feb. 22-25—Weed Society of America meeting, in conjunction with Western Weed Conference, Cosmopolitan Hotel, Denver, Colo.

June 13-18—National Plant Food Institute annual meeting, Greenbrier Hotel, White Sulphur Springs, W. Va.

July 13-15—Eleventh annual Fertilizer Conference of the Pacific Northwest, Hotel Utah, Salt Lake City. E. R. Bertramson, State College of Washington, Pullman, Wash., chairman.

July 27-29—Great Plains Agricultural Council, 1960 meeting, Laramie, Wyo.

BRUSH AND WEED KILLERS

KILL BRUSH at low cost with amazing R-H BRUSH RHAP. Will not injure grasses, grains; not poisonous. For free information write Reasor-Hill Corporation, Box 36CL, Jacksonville, Ark.

KILL SUBMERSED WATER WEEDS which foul up motor propellers, tangle fishing gear, with R-H WEED RHAP-20, Granular 2,4-D. Inexpensive, easy to use, sure results. For free information write Reasor-Hill Corporation, Box 36CL, Jacksonville, Ark.

MR. CORN FARMER: Control broad leaved weeds and grasses (crab grass, fox tails) with R-H WEED RHAP-20, Granular 2,4-D. For free information write Reasor-Hill Coorporation, Box 36CL, Jacksonville, Ark.

NEW OFFICES

EDISON, CAL.—A new office building, measuring about 3 000 sq. ft., has been built for the Agricultural Chemical Fertilizers, Inc., in Edison. The new offices, separate from the plant, are more conveniently located in relation to it than the old, which were on the other side of the railroad track. The facilities are much more modern and larger, and generally more comfortable, reports Bill Huber, sales manager.

CALENDAR FOR 1959-60

NOVEMBER

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Meter Firm Purchases California Company

OAKLAND, CAL.—The Granberg Corp. of Oakland has been acquired by American Meter Co. of Philadelphia. Manufacturing and sales operations at the local firm will be continued under the new management in the 30,000 sq. ft. 2-building plant. The Granberg Corp. will be operated as a subsidiary of American Meter Co.

Announcement of the sale was made jointly by Albert J. Granberg, founder of the Oakland firm, and William G. Hamilton, Jr., president of American Meter Co.

Classified Ads

Classified advertisements accepted until Tuesday each week for the issue of the following Monday.

Rates: 15¢ per word; minimum charge $2.25. Situations wanted, 10¢ a word; $1.50 minimum. Count six words of signature, whether for direct reply or keyed care this office. If advertisement is keyed, care of this office, 20¢ per insertion additional charged for forwarding replies. Commercial advertising not accepted in classified advertising department. Display advertising accepted for insertion at minimum rate of $11 per column inch.

All Want Ads cash with order.

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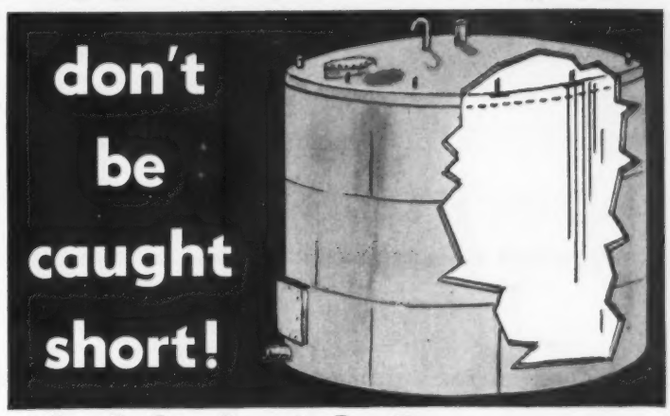
WANTED—MANAGER FOR FERTILIZER and farm chemical department of long established, progressive farm supply organization serving Pacific Northwest agriculture. Requires administrative ability and technical knowledge. Advancement opportunities. Give complete resume of age, education, experience and availability in first letter. Address Ad No. 5373, Croplife, Minneapolis 40, Minn.

SITUATIONS WANTED

SALES POSITION INCLUDING SERVICE of working with soil problem to give better satisfaction for farmers and dealers. This service to include more adequate on the spot and tissue testing. Tillage and crop rotation practices. Have own formula of soil condition (aquazyme). No college degree but 10 years' actual field experience working with existing soil conditions. Roy Hoover, Gilman, Ill.



Add Acid Storage Now At ¼ Normal Cost!

Now you can have all the storage you need for phosporic acid, ammonium nitrate, other acids and corrosive liquids.

You can convert or add ordinary, inexpensive tanks made of mild steel or even wood by simply installing amazing FLEXI-LINERS. These flexible, laminated plastic liners fit in tanks of any size or shape, hold from 100 to 30,000 gallons. Use them with tanks of any type . . . vertical, horizontal, or even open-top design. All outlets are built right in the liner.

FLEXI-LINERS

for all non-pressure storage

FLEXI-LINERS cost only one-fourth as much as high-priced stainless steel or rubber-lined vessels. You save even more by installing them easily yourself or with the help of our factory-trained servicemen.

Best of all, you'll get years of trouble-free performance from every FLEXI-LINER. Widely used in the chemical industry, FLEXI-LINERS have already built a reputation for long-life and economy.

Don't be caught short next season when FLEXI-LINERS can solve your extra storage problem at a 75% saving.

Write for FREE FOLDER and Price List

FLEXI-LINER COMPANY

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PAYLOADER® is more productive

because it's more maneuverable

Never before has so much carry capacity, ease of operation and short-turning ability been combined in a tractor-shovel. That is why the model H-25 "PAYLOADER" is setting new tonnage records on boxcar unloading and other close-quarter work. "No machine you can put in a boxcar is as good as a HOUGH," says Bob Fruen of Fruen Fertilizer, Hatfield, Minn.

It digs and carries 2,500 lbs. low and close with good balance and fullest operator visibility. Power-steering and only 6-foot turning radius, power-shift transmission with torque-converter drive, and powerful hydraulic brakes all assure the operator of safe, easy and accurate control. He can maneuver around corners, through narrow aisles, doorways and crowded yards, up and down ramps with speed and safety.

Your Hough Distributor is ready to show you how the H-25 can increase output at lower cost on your bulk-handling work. Contact him today or use the coupon

These features give low-cost bulk handling

2,500 lbs. carry capacity • Only 6-foot turning radius • Power-shift transmission • Power steering • Power-transfer differential • 40° bucket tipback at ground • 4,500 lb. bucket breakout force • Fullest mechanical protection • Useful extra attachments

HOUGH®

THE FRANK G. HOUGH CO.
LIBERTYVILLE, ILLINOIS
SUBSIDIARY — INTERNATIONAL HARVESTER COMPANY

11-A-1

THE FRANK G. HOUGH CO.
970 Sunnyside Ave., Libertyville, Ill.

☐ Send data on H-25 "PAYLOADER"
☐ Other models to 12,000 lb. carry capacity

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Title _____

Company _____

Street _____

City _____ State _____